

Appendix V. Land Use/Land Cover Selections and Patch Type Justifications.

ENSP staff chose LULC classes from the NJDEP 2012 Modified Anderson System for each species-feature label combination in the formation of species-based patches of habitat. Also, in the delineation of species-based habitat, each species-feature label combination is grouped into a “Patch Type,” or category that describes the method employed to form the valued habitat area from the Landscape base layer. In addition, for each LULC class selected for a particular species-feature label combination, a “LULC Treatment,” or rule, is applied that determines how polygons of a LULC class will interact with a SOA and/or with polygons of other LULC classes in order to construct patches of habitat. The four general patch types are described below along with the LULC Treatments. For those species-feature label combinations that utilize variations, or subtypes, of the four general patch types, an explanation of the subtype is included within the corresponding patch type justification.

BIOPID – a unique ID that represents a species and a set of its feature labels.

Patch Type – a category that describes the method employed to form the valued habitat area from the Landscape base layer for each species-feature label combination. Each species-feature label combination is grouped into one of the following patch type categories.

- **Limited Extent** – polygons from a select set of LULC classes are valued upon intersection with a SOA. Once the valued habitat area is identified, any internal holes or gaps containing polygons of selected LULC classes are also valued if they are completely enclosed by, and contiguous with, the valued area.
- **Contiguous Area** – polygons from a select set of LULC classes are dissolved/combined into contiguous areas and valued upon intersection with a SOA.
- **Cardinal-Proximate** – polygons from an initial, or cardinal, set of LULC classes are valued upon intersection with a SOA and then polygons from a second, proximate set of LULC classes are valued based on a spatial relationship (e.g., adjacency) with polygons from the cardinal set of LULC classes and/or a SOA. Once the valued habitat area is identified, any internal holes or gaps containing polygons of selected LULC classes are also valued if they are completely enclosed by, and contiguous with, the valued area.
- **Stream Centerline** – stream centerlines are valued upon intersection with a SOA.

LULC Treatment – a specific rule applied to an individual LULC class that determines how polygons of the LULC class will interact with a SOA and/or with polygons of other LULC classes in order to construct patches of habitat for each species-feature label combination. For each species-feature label combination, each LULC class selected is assigned one or more of the following LULC treatments.

- o **Undissolved** – polygons are not dissolved and are used as they are mapped in the Landscape base layer.
- o **Dissolved** – polygons are dissolved to form contiguous patches.

- o **Riparian Undissolved** – polygons coded as riparian are not dissolved and are used as they are mapped in the Landscape base layer.
- o **Riparian Dissolved** – polygons coded as riparian are dissolved to form contiguous patches.
- o **Adjacent Undissolved** – polygons are not dissolved and are selected based on adjacency with polygons of other LULC classes; or polygons are not dissolved and are selected based on adjacency with polygons of other LULC classes and a spatial connection with a SOA.
- o **Gap Elimination** – polygons are used to fill in any internal holes or gaps that are completely enclosed by and contiguous with identified habitat areas.

The following table contains all of the Species-Feature Label Combinations sorted alphabetically by class. Click on any BIOPID number to be taken to the Land Use Land Cover Selections and Patch Type Justifications for that BIOPID.

Species-Feature Label Combinations (BIOPID)

Class Actinopterygii

Common Name *Atlantic Sturgeon* **BIOPID** 264

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Migration Corridor - Adult Sighting	State Endangered	LE.2 Limited Extent
Migration Corridor - Juvenile Sighting	State Endangered	LE.2 Limited Extent
Nursery Area - Larvae Sighting	State Endangered	LE.2 Limited Extent
Nursery Area - Young-of-year Sighting	State Endangered	LE.2 Limited Extent
Spawning Area - Adult Sighting	State Endangered	LE.2 Limited Extent
Spawning Area - Egg Sighting	State Endangered	LE.2 Limited Extent
Summering Area - Adult Sighting	State Endangered	LE.2 Limited Extent
Summering Area - Juvenile Sighting	State Endangered	LE.2 Limited Extent

Common Name *Blackbanded Sunfish* **BIOPID** 368

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	Special Concern	SC Stream Centerline

Common Name *Bridle Shiner* **BIOPID** 369

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	State Endangered	SC Stream Centerline

Common Name *Comely Shiner* **BIOPID** 365

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	Special Concern	SC Stream Centerline

Common Name *Ironcolor Shiner* **BIOPID** 362

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	State Endangered	SC Stream Centerline

Common Name *Mud Sunfish* **BIOPID** 370

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	Special Concern	SC Stream Centerline

Common Name *Northern Hog Sucker* **BIOPID** 363

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	Special Concern	SC Stream Centerline

Common Name *Shield Darter* **BIOPID** 366

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	Special Concern	SC Stream Centerline

Common Name *Shortnose Sturgeon* **BIOPID** 263

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Migration Corridor - Adult Sighting	State Endangered	LE.2 Limited Extent
Migration Corridor - Juvenile Sighting	State Endangered	LE.2 Limited Extent
Nursery Area - Larvae Sighting	State Endangered	LE.2 Limited Extent
Nursery Area - Young-of-year Sighting	State Endangered	LE.2 Limited Extent
Overwintering Area - Adult Sighting	State Endangered	LE.2 Limited Extent
Overwintering Area - Juvenile Sighting	State Endangered	LE.2 Limited Extent
Spawning Area - Adult Sighting	State Endangered	LE.2 Limited Extent
Spawning Area - Egg Sighting	State Endangered	LE.2 Limited Extent
Summering Area - Adult Sighting	State Endangered	LE.2 Limited Extent
Summering Area - Juvenile Sighting	State Endangered	LE.2 Limited Extent

Common Name *Slimy Sculpin* **BIOPID** 364

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	State Threatened	SC Stream Centerline

Class Amphibia

Common Name *Blue-spotted Salamander* **BIOPID** 207

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	State Endangered	CP*.5 Cardinal-Proximate
Occupied Habitat	State Endangered	CP*.5 Cardinal-Proximate
On Road	State Endangered	CP*.5 Cardinal-Proximate
Vernal Pool Breeding	State Endangered	CP*.5 Cardinal-Proximate
Vernal Pool Non-breeding	State Endangered	CP*.5 Cardinal-Proximate

Common Name *Carpenter Frog* **BIOPID** 255

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CP*.5 Cardinal-Proximate
Non-breeding Sighting	Special Concern	CP*.5 Cardinal-Proximate

Occupied Habitat	Special Concern	CP*.5 Cardinal-Proximate
On Road	Special Concern	CP*.5 Cardinal-Proximate
Vernal Pool Breeding	Special Concern	CP*.5 Cardinal-Proximate
Vernal Pool Non-breeding	Special Concern	CP*.5 Cardinal-Proximate

Common Name *Cope's Gray Treefrog* **BIOPID** 230

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CP*.5 Cardinal-Proximate
Non-breeding Sighting	State Threatened	CP*.5 Cardinal-Proximate
Occupied Habitat	State Threatened	CP*.5 Cardinal-Proximate
On Road	State Threatened	CP*.5 Cardinal-Proximate
Vernal Pool Breeding	State Threatened	CP*.5 Cardinal-Proximate
Vernal Pool Non-breeding	State Threatened	CP*.5 Cardinal-Proximate

Common Name *Eastern Cricket Frog* **BIOPID** 338

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	LE.1 Limited Extent
Non-breeding Sighting	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent
On Road	Special Concern	LE.1 Limited Extent
Vernal Pool Breeding	Special Concern	LE.1 Limited Extent
Vernal Pool Non-breeding	Special Concern	LE.1 Limited Extent

Common Name *Eastern Long-tailed Salamander* **BIOPID** 210

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CA*.4 Contiguous Area
Non-breeding Sighting	State Threatened	CA*.4 Contiguous Area
Occupied Habitat	State Threatened	CA*.4 Contiguous Area
On Road	State Threatened	CA*.4 Contiguous Area
Vernal Pool Breeding	State Threatened	CA*.4 Contiguous Area
Vernal Pool Non-breeding	State Threatened	CA*.4 Contiguous Area

Common Name *Eastern Mud Salamander* **BIOPID** 277

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	State Threatened	LE.1 Limited Extent
On Road	State Threatened	LE.1 Limited Extent

Common Name *Eastern Spadefoot* **BIOPID** 352

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	CP*.5 Cardinal-Proximate
Occupied Habitat	Special Concern	CP*.5 Cardinal-Proximate
On Road	Special Concern	CP*.5 Cardinal-Proximate
Vernal Pool Breeding	Special Concern	CP*.5 Cardinal-Proximate
Vernal Pool Non-breeding	Special Concern	CP*.5 Cardinal-Proximate

Common Name *Eastern Tiger Salamander* **BIOPID** 220

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	State Endangered	CA.2 Contiguous Area
Occupied Habitat	State Endangered	CA.2 Contiguous Area
On Road	State Endangered	CA.2 Contiguous Area
Vernal Pool Breeding	State Endangered	CA.2 Contiguous Area
Vernal Pool Non-breeding	State Endangered	CA.2 Contiguous Area

Common Name *Jefferson Salamander* **BIOPID** 208

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	CP*.5 Cardinal-Proximate
Occupied Habitat	Special Concern	CP*.5 Cardinal-Proximate
On Road	Special Concern	CP*.5 Cardinal-Proximate
Vernal Pool Breeding	Special Concern	CP*.5 Cardinal-Proximate
Vernal Pool Non-breeding	Special Concern	CP*.5 Cardinal-Proximate

Common Name *Marbled Salamander* **BIOPID** 209

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	CP*.5 Cardinal-Proximate
Occupied Habitat	Special Concern	CP*.5 Cardinal-Proximate
On Road	Special Concern	CP*.5 Cardinal-Proximate
Vernal Pool Breeding	Special Concern	CP*.5 Cardinal-Proximate
Vernal Pool Non-breeding	Special Concern	CP*.5 Cardinal-Proximate

Common Name *New Jersey Chorus Frog* **BIOPID** 321

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CP.3 Cardinal-Proximate
Non-breeding Sighting	Special Concern	CP.3 Cardinal-Proximate
Occupied Habitat	Special Concern	CP.3 Cardinal-Proximate

On Road	Special Concern	CP.3 Cardinal-Proximate
Vernal Pool Breeding	Special Concern	CP.3 Cardinal-Proximate
Vernal Pool Non-breeding	Special Concern	CP.3 Cardinal-Proximate

Common Name *Northern Spring Salamander* **BIOPID** 279

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	Special Concern	LE.1 Limited Extent
On Road	Special Concern	LE.1 Limited Extent

Common Name *Pine Barrens Treefrog* **BIOPID** 231

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CP*.5 Cardinal-Proximate
Non-breeding Sighting	State Threatened	CP*.5 Cardinal-Proximate
Occupied Habitat	State Threatened	CP*.5 Cardinal-Proximate
On Road	State Threatened	CP*.5 Cardinal-Proximate
Vernal Pool Breeding	State Threatened	CP*.5 Cardinal-Proximate
Vernal Pool Non-breeding	State Threatened	CP*.5 Cardinal-Proximate

Common Name *Spotted Salamander* **BIOPID** 355

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	CP*.5 Cardinal-Proximate
Occupied Habitat	Special Concern	CP*.5 Cardinal-Proximate
On Road	Special Concern	CP*.5 Cardinal-Proximate
Vernal Pool Breeding	Special Concern	CP*.5 Cardinal-Proximate
Vernal Pool Non-breeding	Special Concern	CP*.5 Cardinal-Proximate

Class Aves

Common Name *American Bittern* **BIOPID** 160

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting-Confirmed	State Endangered	CA.5 Contiguous Area
Nest	State Endangered	CA.5 Contiguous Area
Roosting Area	State Endangered	CA.5 Contiguous Area

Common Name *American Kestrel* **BIOPID** 274

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CA.2 Contiguous Area
Nest	State Threatened	CA.2 Contiguous Area
Non-breeding Sighting	State Threatened	CA.2 Contiguous Area

Common Name *American Oystercatcher* **BIOPID** 161

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nest	Special Concern	CA.1 Contiguous Area
Nesting Area	Special Concern	CA.1 Contiguous Area
Non-breeding Concentration	Special Concern	CA.1 Contiguous Area

Common Name *Bald Eagle* **BIOPID** 221

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nest	Special Concern	LE.1 Limited Extent

Common Name *Bald Eagle* **BIOPID** 236

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.3 Limited Extent

Common Name *Bald Eagle* **BIOPID** 238

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Roosting Area	Special Concern	LE.1 Limited Extent

Common Name *Barn Owl* **BIOPID** 225

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CP.1 Cardinal-Proximate
Breeding Sighting-Confirmed	State Threatened	CP.1 Cardinal-Proximate
Non-breeding Sighting	Special Concern	CP.1 Cardinal-Proximate

Common Name *Barred Owl* **BIOPID** 38

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CA.1 Contiguous Area
Nest	State Threatened	CA.1 Contiguous Area
Non-breeding Sighting	State Threatened	CA.1 Contiguous Area
Roosting Area	State Threatened	CA.1 Contiguous Area

Common Name *Black Rail* **BIOPID** 162

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting-Confirmed	State Endangered	CA.4 Contiguous Area
Nest	State Endangered	CA.4 Contiguous Area
Roosting Area	State Endangered	CA.4 Contiguous Area

Common Name *Black Skimmer* **BIOPID** 163

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	State Endangered	LE.1 Limited Extent

Non-breeding Concentration

State Endangered

LE.1 Limited Extent

Common Name ***Black Skimmer*** **BIOPID** 164

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Endangered	LE.3 Limited Extent

Common Name ***Black-billed Cuckoo*** **BIOPID** 47

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CP*.1 Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	CP*.1 Cardinal-Proximate

Common Name ***Blackburnian Warbler*** **BIOPID** 48

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CA.1 Contiguous Area
Breeding Sighting-Confirmed	Special Concern	CA.1 Contiguous Area

Common Name ***Black-crowned Night-heron*** **BIOPID** 166

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	State Threatened	LE.1 Limited Extent
Roosting Area	State Threatened	LE.1 Limited Extent

Common Name ***Black-crowned Night-heron*** **BIOPID** 167

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Threatened	LE.3 Limited Extent

Common Name ***Black-throated Blue Warbler*** **BIOPID** 49

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CA.1 Contiguous Area
Breeding Sighting-Confirmed	Special Concern	CA.1 Contiguous Area

Common Name ***Black-throated Green Warbler*** **BIOPID** 35

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CA.1 Contiguous Area
Breeding Sighting-Confirmed	Special Concern	CA.1 Contiguous Area

Common Name ***Blue-winged Warbler*** **BIOPID** 339

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CP*.1 Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	CP*.1 Cardinal-Proximate

Common Name ***Bobolink*** **BIOPID** 34

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>

Breeding Sighting	State Threatened	CA.1 Contiguous Area
Breeding Sighting-Confirmed	State Threatened	CA.1 Contiguous Area

Common Name *Bobolink* **BIOPID** 54

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	LE.1 Limited Extent

Common Name *Broad-winged Hawk* **BIOPID** 226

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	LE.1 Limited Extent
Nest	Special Concern	LE.1 Limited Extent

Common Name *Brown Thrasher* **BIOPID** 51

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CP*.3 Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	CP*.3 Cardinal-Proximate

Common Name *Canada Warbler* **BIOPID** 52

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CA.1 Contiguous Area
Breeding Sighting-Confirmed	Special Concern	CA.1 Contiguous Area

Common Name *Caspian Tern* **BIOPID** 168

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	Special Concern	LE.1 Limited Extent

Common Name *Caspian Tern* **BIOPID** 169

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent

Common Name *Cattle Egret* **BIOPID** 200

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	Special Concern	LE.1 Limited Extent
Roosting Area	Special Concern	LE.1 Limited Extent

Common Name *Cattle Egret* **BIOPID** 201

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent

Common Name *Cerulean Warbler* **BIOPID** 53

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CA.1 Contiguous Area

Breeding Sighting-Confirmed	Special Concern	CA.1 Contiguous Area
Common Name <i>Cerulean Warbler</i>	BIOPID	55
Feature Label	NJ Status	Patch Type
Non-breeding Sighting	Special Concern	LE.1 Limited Extent
Common Name <i>Chimney Swift</i>	BIOPID	340
Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	LE.1 Limited Extent
Breeding Sighting-Confirmed	Special Concern	LE.1 Limited Extent
Common Name <i>Cliff Swallow</i>	BIOPID	218
Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	CA.1 Contiguous Area
Breeding Sighting-Confirmed	Special Concern	CA.1 Contiguous Area
Common Name <i>Common Nighthawk</i>	BIOPID	56
Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	LE.1 Limited Extent
Breeding Sighting-Confirmed	Special Concern	LE.1 Limited Extent
Common Name <i>Common Tern</i>	BIOPID	170
Feature Label	NJ Status	Patch Type
Nesting Colony	Special Concern	LE.1 Limited Extent
Common Name <i>Common Tern</i>	BIOPID	171
Feature Label	NJ Status	Patch Type
Foraging	Special Concern	LE.3 Limited Extent
Common Name <i>Eastern Meadowlark</i>	BIOPID	58
Feature Label	NJ Status	Patch Type
Breeding Sighting	State Threatened	CA.1 Contiguous Area
Breeding Sighting-Confirmed	State Threatened	CA.1 Contiguous Area
Common Name <i>Eastern Whip-poor-will</i>	BIOPID	82
Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	CP*.1 Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	CP*.1 Cardinal-Proximate
Non-breeding Sighting	Special Concern	CP*.1 Cardinal-Proximate
Common Name <i>Field Sparrow</i>	BIOPID	341
Feature Label	NJ Status	Patch Type

Breeding Sighting	Special Concern	CP.*6 Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	CP.*6 Cardinal-Proximate

Common Name *Glossy Ibis* **BIOPID** 198

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	Special Concern	LE.1 Limited Extent
Roosting Area	Special Concern	LE.1 Limited Extent

Common Name *Glossy Ibis* **BIOPID** 199

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.3 Limited Extent

Common Name *Golden-winged Warbler* **BIOPID** 60

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Endangered	CP*.1 Cardinal-Proximate
Breeding Sighting-Confirmed	State Endangered	CP*.1 Cardinal-Proximate

Common Name *Golden-winged Warbler* **BIOPID** 359

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	State Endangered	CP*.1 Cardinal-Proximate

Common Name *Grasshopper Sparrow* **BIOPID** 61

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CA.1 Contiguous Area
Breeding Sighting-Confirmed	State Threatened	CA.1 Contiguous Area

Common Name *Grasshopper Sparrow* **BIOPID** 360

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	LE.1 Limited Extent

Common Name *Great Blue Heron* **BIOPID** 172

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	Special Concern	LE.1 Limited Extent
Roosting Area	Special Concern	LE.1 Limited Extent

Common Name *Great Blue Heron* **BIOPID** 173

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.3 Limited Extent

Common Name *Gull-billed Tern* **BIOPID** 178

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	CA.4 Contiguous Area

Nesting Colony

Special Concern

CA.4 Contiguous Area

Common Name *Henslow's Sparrow* **BIOPID** 63

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Endangered	CP*.1 Cardinal-Proximate
Breeding Sighting-Confirmed	State Endangered	CP*.1 Cardinal-Proximate

Common Name *Henslow's Sparrow* **BIOPID** 64

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	State Endangered	LE.1 Limited Extent

Common Name *Horned Lark* **BIOPID** 66

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CP*.1 Cardinal-Proximate
Breeding Sighting-Confirmed	State Threatened	CP*.1 Cardinal-Proximate
Non-breeding Sighting	Special Concern	CP*.1 Cardinal-Proximate

Common Name *Kentucky Warbler* **BIOPID** 67

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CP*.1 Cardinal-Proximate
Breeding Sighting-Confirmed	State Threatened	CP*.1 Cardinal-Proximate

Common Name *Kentucky Warbler* **BIOPID** 68

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	LE.1 Limited Extent

Common Name *King Rail* **BIOPID** 324

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting-Confirmed	State Endangered	CA.4 Contiguous Area
Nest	State Endangered	CA.4 Contiguous Area
Roosting Area	State Endangered	CA.4 Contiguous Area

Common Name *Least Bittern* **BIOPID** 181

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting-Confirmed	Special Concern	CA.4 Contiguous Area
Nest	Special Concern	CA.4 Contiguous Area
Roosting Area	Special Concern	CA.4 Contiguous Area

Common Name *Least Flycatcher* **BIOPID** 69

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CP*.1 Cardinal-Proximate

Breeding Sighting-Confirmed

Special Concern

CP*.1 Cardinal-Proximate

Common Name *Least Tern* **BIOPID** 182

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	State Endangered	LE.1 Limited Extent

Common Name *Least Tern* **BIOPID** 183

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Endangered	LE.3 Limited Extent

Common Name *Little Blue Heron* **BIOPID** 184

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	Special Concern	LE.1 Limited Extent
Roosting Area	Special Concern	LE.1 Limited Extent

Common Name *Little Blue Heron* **BIOPID** 185

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.3 Limited Extent

Common Name *Loggerhead Shrike* **BIOPID** 70

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	State Endangered	LE.1 Limited Extent

Common Name *Long-eared Owl* **BIOPID** 222

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CP.1 Cardinal-Proximate
Nest	State Threatened	CP.1 Cardinal-Proximate
Non-breeding Sighting	State Threatened	CP.1 Cardinal-Proximate

Common Name *Long-eared Owl* **BIOPID** 223

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Roosting Area	State Threatened	CA.1 Contiguous Area

Common Name *Migratory Raptor
Concentration Site* **BIOPID** 241

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Concentration	NA	LE.1 Limited Extent

Common Name *Nashville Warbler* **BIOPID** 71

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CP.1 Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	CP.1 Cardinal-Proximate

Common Name *Northern Goshawk* **BIOPID** 41

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Endangered	CA.1 Contiguous Area
Nest	State Endangered	CA.1 Contiguous Area

Common Name *Northern Harrier* **BIOPID** 224

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Endangered	CP.1 Cardinal-Proximate
Nest	State Endangered	CP.1 Cardinal-Proximate
Non-breeding Sighting	Special Concern	CP.1 Cardinal-Proximate

Common Name *Olive-sided Flycatcher* **BIOPID** 344

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	LE.1 Limited Extent

Common Name *Peregrine Falcon* **BIOPID** 239

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nest	State Threatened	LE.3 Limited Extent
Urban Nest	State Threatened	LE.3 Limited Extent

Common Name *Pied-billed Grebe* **BIOPID** 186

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting-Confirmed	State Endangered	CA.5 Contiguous Area
Nest	State Endangered	CA.5 Contiguous Area

Common Name *Piping Plover* **BIOPID** 187

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nest	State Endangered	LE.1 Limited Extent
Nesting Area	State Endangered	LE.1 Limited Extent
Non-breeding Concentration	State Endangered	LE.1 Limited Extent

Common Name *Prairie Warbler* **BIOPID** 345

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CP*.1 Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	CP*.1 Cardinal-Proximate

Common Name *Red Knot* **BIOPID** 214

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	State Endangered	LE.1 Limited Extent

Common Name *Red-headed Woodpecker* **BIOPID** 73

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CP*.1 Cardinal-Proximate
Breeding Sighting-Confirmed	State Threatened	CP*.1 Cardinal-Proximate

Common Name *Red-headed Woodpecker* **BIOPID** 74

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	CP*.1 Cardinal-Proximate

Common Name *Red-shouldered Hawk* **BIOPID** 204

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Endangered	LE.1 Limited Extent
Nest	State Endangered	LE.1 Limited Extent
Non-breeding Sighting	Special Concern	LE.1 Limited Extent

Common Name *Roseate Tern* **BIOPID** 188

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	State Endangered	LE.1 Limited Extent

Common Name *Roseate Tern* **BIOPID** 189

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Endangered	LE.3 Limited Extent

Common Name *Rose-breasted Grosbeak* **BIOPID** 347

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	LE.1 Limited Extent
Breeding Sighting-Confirmed	Special Concern	LE.1 Limited Extent

Common Name *Ruddy Turnstone* **BIOPID** 328

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	LE.1 Limited Extent

Common Name *Rusty Blackbird* **BIOPID** 349

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Migration	Special Concern	LE.1 Limited Extent
Winter Roost	Special Concern	LE.1 Limited Extent
Winter Sighting	Special Concern	LE.1 Limited Extent

Common Name *Saltmarsh Sparrow* **BIOPID** 75

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CP*.1 Cardinal-Proximate

Nest	State Threatened	CP*.1 Cardinal-Proximate
Non-breeding Sighting	Special Concern	CP*.1 Cardinal-Proximate
Urban Nest	State Threatened	CP*.1 Cardinal-Proximate

Common Name *Sanderling* **BIOPID** 215

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	LE.1 Limited Extent

Common Name *Savannah Sparrow* **BIOPID** 76

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Threatened	CA.1 Contiguous Area
Breeding Sighting-Confirmed	State Threatened	CA.1 Contiguous Area

Common Name *Sedge Wren* **BIOPID** 87

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Endangered	CP.1 Cardinal-Proximate
Nest	State Endangered	CP.1 Cardinal-Proximate
Non-breeding Sighting	State Endangered	CP.1 Cardinal-Proximate

Common Name *Semipalmated Sandpiper* **BIOPID** 216

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Non-breeding Sighting	Special Concern	LE.1 Limited Extent

Common Name *Sharp-shinned Hawk* **BIOPID** 240

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	LE.1 Limited Extent
Nest	Special Concern	LE.1 Limited Extent

Common Name *Short-eared Owl* **BIOPID** 273

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	State Endangered	CA.1 Contiguous Area
Nest	State Endangered	CA.1 Contiguous Area
Non-breeding Sighting	Special Concern	CA.1 Contiguous Area

Common Name *Snowy Egret* **BIOPID** 202

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	Special Concern	LE.1 Limited Extent
Roosting Area	Special Concern	LE.1 Limited Extent

Common Name *Snowy Egret* **BIOPID** 203

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>

Foraging	Special Concern	LE.3 Limited Extent
Common Name <i>Tricolored Heron</i>	BIOPID	192
Feature Label	NJ Status	Patch Type
Nesting Colony	Special Concern	LE.1 Limited Extent
Roosting Area	Special Concern	LE.1 Limited Extent
Common Name <i>Tricolored Heron</i>	BIOPID	193
Feature Label	NJ Status	Patch Type
Foraging	Special Concern	LE.3 Limited Extent
Common Name <i>Upland Sandpiper</i>	BIOPID	77
Feature Label	NJ Status	Patch Type
Breeding Sighting	State Endangered	CA.1 Contiguous Area
Breeding Sighting-Confirmed	State Endangered	CA.1 Contiguous Area
Common Name <i>Upland Sandpiper</i>	BIOPID	78
Feature Label	NJ Status	Patch Type
Non-breeding Sighting	State Endangered	LE.1 Limited Extent
Common Name <i>Veery</i>	BIOPID	79
Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	CA.1 Contiguous Area
Breeding Sighting-Confirmed	Special Concern	CA.1 Contiguous Area
Common Name <i>Vesper Sparrow</i>	BIOPID	80
Feature Label	NJ Status	Patch Type
Breeding Sighting	State Endangered	CP.1 Cardinal-Proximate
Breeding Sighting-Confirmed	State Endangered	CP.1 Cardinal-Proximate
Common Name <i>Vesper Sparrow</i>	BIOPID	81
Feature Label	NJ Status	Patch Type
Non-breeding Sighting	Special Concern	LE.1 Limited Extent
Common Name <i>Winter Wren</i>	BIOPID	83
Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	CA.1 Contiguous Area
Breeding Sighting-Confirmed	Special Concern	CA.1 Contiguous Area
Common Name <i>Wood Thrush</i>	BIOPID	84
Feature Label	NJ Status	Patch Type
Breeding Sighting	Special Concern	LE.1 Limited Extent

Breeding Sighting-Confirmed

Special Concern

LE.1 Limited Extent

Common Name *Yellow-breasted Chat***BIOPID**

86

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding Sighting	Special Concern	CP*.1 Cardinal-Proximate
Breeding Sighting-Confirmed	Special Concern	CP*.1 Cardinal-Proximate

Common Name *Yellow-crowned Night-heron***BIOPID**

10

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Colony	State Threatened	CP*.1 Cardinal-Proximate
Roosting Area	State Threatened	CP*.1 Cardinal-Proximate

Common Name *Yellow-crowned Night-heron***BIOPID**

197

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Threatened	LE.3 Limited Extent

Class Bivalvia**Common Name** *Brook Floater***BIOPID**

245

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Fresh Dead Individual	State Endangered	SC Stream Centerline
Fresh Shell Sighting	State Endangered	SC Stream Centerline
Live Individual Sighting	State Endangered	SC Stream Centerline

Common Name *Creeper***BIOPID**

246

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Fresh Dead Individual	Special Concern	SC Stream Centerline
Fresh Shell Sighting	Special Concern	SC Stream Centerline
Live Individual Sighting	Special Concern	SC Stream Centerline

Common Name *Dwarf Wedgemussel***BIOPID**

247

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Fresh Dead Individual	State Endangered	SC Stream Centerline
Fresh Shell Sighting	State Endangered	SC Stream Centerline
Live Individual Sighting	State Endangered	SC Stream Centerline

Common Name *Eastern Lampmussel***BIOPID**

248

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Fresh Dead Individual	State Threatened	SC Stream Centerline
Fresh Shell Sighting	State Threatened	SC Stream Centerline
Live Individual Sighting	State Threatened	SC Stream Centerline

Common Name *Eastern Pondmussel* **BIOPID** 249

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Fresh Dead Individual	State Threatened	SC Stream Centerline
Fresh Shell Sighting	State Threatened	SC Stream Centerline
Live Individual Sighting	State Threatened	SC Stream Centerline

Common Name *Green Floater* **BIOPID** 250

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Fresh Dead Individual	State Endangered	SC Stream Centerline
Fresh Shell Sighting	State Endangered	SC Stream Centerline
Live Individual Sighting	State Endangered	SC Stream Centerline

Common Name *Tidewater Mucket* **BIOPID** 251

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Fresh Dead Individual	State Threatened	SC Stream Centerline
Fresh Shell Sighting	State Threatened	SC Stream Centerline
Live Individual Sighting	State Threatened	SC Stream Centerline

Common Name *Triangle Floater* **BIOPID** 252

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Fresh Dead Individual	State Threatened	SC Stream Centerline
Fresh Shell Sighting	State Threatened	SC Stream Centerline
Live Individual Sighting	State Threatened	SC Stream Centerline

Common Name *Yellow Lampmussel* **BIOPID** 253

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Fresh Dead Individual	State Threatened	SC Stream Centerline
Fresh Shell Sighting	State Threatened	SC Stream Centerline
Live Individual Sighting	State Threatened	SC Stream Centerline

Class Insecta

Common Name *Acadian Hairstreak* **BIOPID** 291

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Endangered	LE.1 Limited Extent
Casual Flyby	State Endangered	LE.1 Limited Extent
Larvae Sighting	State Endangered	LE.1 Limited Extent
Nectaring	State Endangered	LE.1 Limited Extent
Pupae Sighting	State Endangered	LE.1 Limited Extent

Common Name *Allegheny River Cruiser* **BIOPID** 136

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Allegheny River Cruiser* **BIOPID** 137

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Arrowhead Spiketail* **BIOPID** 98

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP.3 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP.3 Cardinal-Proximate
Larvae Sighting	Special Concern	CP.3 Cardinal-Proximate
Territorial Display	Special Concern	CP.3 Cardinal-Proximate

Common Name *Arrowhead Spiketail* **BIOPID** 99

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Baltimore Checkerspot* **BIOPID** 303

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	Special Concern	LE.1 Limited Extent
Nectaring	Special Concern	LE.1 Limited Extent

Common Name *Baltimore Checkerspot* **BIOPID** 304

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP.1 Cardinal-Proximate
Larvae Sighting	Special Concern	CP.1 Cardinal-Proximate
Pupae Sighting	Special Concern	CP.1 Cardinal-Proximate

Common Name *Banner Clubtail* **BIOPID** 134

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP*.4 Cardinal-Proximate
Exuviae Sighting	State Threatened	CP*.4 Cardinal-Proximate

Larvae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Territorial Display	State Threatened	CP*.4 Cardinal-Proximate

Common Name *Banner Clubtail* **BIOPID** 135

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Threatened	LE.1 Limited Extent
Occupied Habitat	State Threatened	LE.1 Limited Extent

Common Name *Bronze Copper* **BIOPID** 30

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Endangered	CP.1 Cardinal-Proximate
Larvae Sighting	State Endangered	CP.1 Cardinal-Proximate
Pupae Sighting	State Endangered	CP.1 Cardinal-Proximate

Common Name *Bronze Copper* **BIOPID** 31

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	State Endangered	LE.1 Limited Extent
Nectaring	State Endangered	LE.1 Limited Extent

Common Name *Brook Snaketail* **BIOPID** 122

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP*.4 Cardinal-Proximate
Exuviae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Larvae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Territorial Display	State Threatened	CP*.4 Cardinal-Proximate

Common Name *Brook Snaketail* **BIOPID** 123

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Threatened	LE.1 Limited Extent
Occupied Habitat	State Threatened	LE.1 Limited Extent

Common Name *Brush-tipped Emerald* **BIOPID** 146

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Brush-tipped Emerald* **BIOPID** 147

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>

Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Checkered White* **BIOPID** 28

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP.1 Cardinal-Proximate
Larvae Sighting	State Threatened	CP.1 Cardinal-Proximate
Pupae Sighting	State Threatened	CP.1 Cardinal-Proximate

Common Name *Checkered White* **BIOPID** 29

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	State Threatened	LE.1 Limited Extent
Nectaring	State Threatened	LE.1 Limited Extent

Common Name *Cobra Clubtail* **BIOPID** 114

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Cobra Clubtail* **BIOPID** 115

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Common Roadside-Skipper* **BIOPID** 295

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP.1 Cardinal-Proximate
Larvae Sighting	State Threatened	CP.1 Cardinal-Proximate
Pupae Sighting	State Threatened	CP.1 Cardinal-Proximate

Common Name *Compton Tortoiseshell* **BIOPID** 298

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	LE.1 Limited Extent
Casual Flyby	Special Concern	LE.1 Limited Extent
Larvae Sighting	Special Concern	LE.1 Limited Extent
Nectaring	Special Concern	LE.1 Limited Extent
Pupae Sighting	Special Concern	LE.1 Limited Extent

Common Name *Coppery Emerald* **BIOPID** 133

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Crimson-ringed Whiteface* **BIOPID** 156

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Crimson-ringed Whiteface* **BIOPID** 157

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Dotted Skipper* **BIOPID** 16

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP.1 Cardinal-Proximate
Larvae Sighting	State Threatened	CP.1 Cardinal-Proximate
Pupae Sighting	State Threatened	CP.1 Cardinal-Proximate

Common Name *Dotted Skipper* **BIOPID** 17

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	State Threatened	LE.1 Limited Extent
Nectaring	State Threatened	LE.1 Limited Extent

Common Name *Dusted Skipper* **BIOPID** 302

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP.1 Cardinal-Proximate
Larvae Sighting	Special Concern	CP.1 Cardinal-Proximate
Pupae Sighting	Special Concern	CP.1 Cardinal-Proximate

Common Name *Eastern Arogos Skipper* **BIOPID** 11

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	State Endangered	LE.1 Limited Extent
Nectaring	State Endangered	LE.1 Limited Extent

Common Name *Eastern Arogos Skipper* **BIOPID** 95

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Endangered	CP.1 Cardinal-Proximate
Larvae Sighting	State Endangered	CP.1 Cardinal-Proximate
Pupae Sighting	State Endangered	CP.1 Cardinal-Proximate

Common Name *Eastern Beach Tiger Beetle* **BIOPID** 244

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Endangered	LE.1 Limited Extent
Larvae Sighting	State Endangered	LE.1 Limited Extent
Occupied Habitat	State Endangered	LE.1 Limited Extent

Common Name *Eyed Brown* **BIOPID** 305

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	Special Concern	LE.1 Limited Extent
Nectaring	Special Concern	LE.1 Limited Extent

Common Name *Forcipate Emerald* **BIOPID** 153

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Frosted Elfin* **BIOPID** 22

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP.1 Cardinal-Proximate
Larvae Sighting	State Threatened	CP.1 Cardinal-Proximate
Pupae Sighting	State Threatened	CP.1 Cardinal-Proximate

Common Name *Frosted Elfin* **BIOPID** 23

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	State Threatened	LE.1 Limited Extent
Nectaring	State Threatened	LE.1 Limited Extent

Common Name *Georgia Satyr* **BIOPID** 12

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP.1 Cardinal-Proximate
Larvae Sighting	State Threatened	CP.1 Cardinal-Proximate
Pupae Sighting	State Threatened	CP.1 Cardinal-Proximate

Common Name *Georgia Satyr* **BIOPID** 13

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	State Threatened	LE.1 Limited Extent
Nectaring	State Threatened	LE.1 Limited Extent

Common Name *Golden-winged Skimmer* **BIOPID** 104

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP.3 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP.3 Cardinal-Proximate
Larvae Sighting	Special Concern	CP.3 Cardinal-Proximate
Territorial Display	Special Concern	CP.3 Cardinal-Proximate

Common Name *Golden-winged Skimmer* **BIOPID** 105

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Gray Comma* **BIOPID** 296

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	LE.1 Limited Extent
Casual Flyby	State Threatened	LE.1 Limited Extent
Larvae Sighting	State Threatened	LE.1 Limited Extent
Nectaring	State Threatened	LE.1 Limited Extent
Pupae Sighting	State Threatened	LE.1 Limited Extent

Common Name *Gray Petaltail* **BIOPID** 91

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Endangered	CP.3 Cardinal-Proximate
Exuviae Sighting	State Endangered	CP.3 Cardinal-Proximate
Larvae Sighting	State Endangered	CP.3 Cardinal-Proximate
Territorial Display	State Endangered	CP.3 Cardinal-Proximate

Common Name *Gray Petaltail* **BIOPID** 92

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Endangered	LE.1 Limited Extent
Occupied Habitat	State Endangered	LE.1 Limited Extent

Common Name *Green-faced Clubtail* **BIOPID** 112

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>

Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Green-faced Clubtail* **BIOPID** 113

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Harpoon Clubtail* **BIOPID** 126

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP*.4 Cardinal-Proximate
Exuviae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Larvae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Territorial Display	State Threatened	CP*.4 Cardinal-Proximate

Common Name *Harpoon Clubtail* **BIOPID** 127

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Threatened	LE.1 Limited Extent
Occupied Habitat	State Threatened	LE.1 Limited Extent

Common Name *Harris's Checkerspot* **BIOPID** 20

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	LE.1 Limited Extent
Casual Flyby	Special Concern	LE.1 Limited Extent
Larvae Sighting	Special Concern	LE.1 Limited Extent
Nectaring	Special Concern	LE.1 Limited Extent
Pupae Sighting	Special Concern	LE.1 Limited Extent

Common Name *Hessel's Hairstreak* **BIOPID** 176

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP.1 Cardinal-Proximate
Larvae Sighting	Special Concern	CP.1 Cardinal-Proximate
Pupae Sighting	Special Concern	CP.1 Cardinal-Proximate

Common Name *Hessel's Hairstreak* **BIOPID** 177

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	Special Concern	LE.1 Limited Extent

Nectaring

Special Concern

LE.1 Limited Extent

Common Name *Hickory Hairstreak***BIOPID**

299

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	LE.1 Limited Extent
Casual Flyby	Special Concern	LE.1 Limited Extent
Larvae Sighting	Special Concern	LE.1 Limited Extent
Nectaring	Special Concern	LE.1 Limited Extent
Pupae Sighting	Special Concern	LE.1 Limited Extent

Common Name *Hoary Elf***BIOPID**

24

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP.1 Cardinal-Proximate
Larvae Sighting	State Threatened	CP.1 Cardinal-Proximate
Pupae Sighting	State Threatened	CP.1 Cardinal-Proximate

Common Name *Hudsonian Whiteface***BIOPID**

154

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Hudsonian Whiteface***BIOPID**

155

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Kennedy's Emerald***BIOPID**

158

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP*.4 Cardinal-Proximate
Exuviae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Larvae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Territorial Display	State Threatened	CP*.4 Cardinal-Proximate

Common Name *Leonard's Skipper***BIOPID**

89

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP.1 Cardinal-Proximate
Larvae Sighting	State Threatened	CP.1 Cardinal-Proximate

Pupae Sighting

State Threatened

CP.1 Cardinal-Proximate

Common Name *Leonard's Skipper***BIOPID****90**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	State Threatened	LE.1 Limited Extent
Nectaring	State Threatened	LE.1 Limited Extent

Common Name *Maine Snaketail***BIOPID****128**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Maine Snaketail***BIOPID****129**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Midland Clubtail***BIOPID****116**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Mitchell's Satyr***BIOPID****19**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Endangered	LE.1 Limited Extent
Casual Flyby	State Endangered	LE.1 Limited Extent
Larvae Sighting	State Endangered	LE.1 Limited Extent
Nectaring	State Endangered	LE.1 Limited Extent
Pupae Sighting	State Endangered	LE.1 Limited Extent

Common Name *Monarch***BIOPID****307**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	LE.1 Limited Extent
Casual Flyby	Special Concern	LE.1 Limited Extent
Larvae Sighting	Special Concern	LE.1 Limited Extent

Nectaring	Special Concern	LE.1 Limited Extent
Pupae Sighting	Special Concern	LE.1 Limited Extent

Common Name *Myrina Fritillary* **BIOPID** 18

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Endangered	CP.1 Cardinal-Proximate
Larvae Sighting	State Endangered	CP.1 Cardinal-Proximate
Pupae Sighting	State Endangered	CP.1 Cardinal-Proximate

Common Name *Myrina Fritillary* **BIOPID** 88

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	State Endangered	LE.1 Limited Extent
Nectaring	State Endangered	LE.1 Limited Extent

Common Name *New England Bluet* **BIOPID** 108

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP.3 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP.3 Cardinal-Proximate
Larvae Sighting	Special Concern	CP.3 Cardinal-Proximate
Territorial Display	Special Concern	CP.3 Cardinal-Proximate

Common Name *New England Bluet* **BIOPID** 109

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Northern Metalmark* **BIOPID** 26

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Endangered	LE.1 Limited Extent
Casual Flyby	State Endangered	LE.1 Limited Extent
Larvae Sighting	State Endangered	LE.1 Limited Extent
Nectaring	State Endangered	LE.1 Limited Extent
Pupae Sighting	State Endangered	LE.1 Limited Extent

Common Name *Pepper and Salt Skipper* **BIOPID** 293

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	State Threatened	LE.1 Limited Extent
Nectaring	State Threatened	LE.1 Limited Extent

Common Name *Pine Barrens Bluet* **BIOPID** 102

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP.3 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP.3 Cardinal-Proximate
Larvae Sighting	Special Concern	CP.3 Cardinal-Proximate
Territorial Display	Special Concern	CP.3 Cardinal-Proximate

Common Name *Pine Barrens Bluet* **BIOPID** 103

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Rapids Clubtail* **BIOPID** 120

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Rapids Clubtail* **BIOPID** 121

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Rare Skipper* **BIOPID** 350

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	LE.1 Limited Extent
Casual Flyby	Special Concern	LE.1 Limited Extent
Larvae Sighting	Special Concern	LE.1 Limited Extent
Nectaring	Special Concern	LE.1 Limited Extent
Pupae Sighting	Special Concern	LE.1 Limited Extent

Common Name *Robust Baskettail* **BIOPID** 138

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP*.4 Cardinal-Proximate
Exuviae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Larvae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Territorial Display	State Threatened	CP*.4 Cardinal-Proximate

Common Name *Robust Baskettail* **BIOPID** 139

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Threatened	LE.1 Limited Extent
Occupied Habitat	State Threatened	LE.1 Limited Extent

Common Name *Sable Clubtail* **BIOPID** 100

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP.3 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP.3 Cardinal-Proximate
Larvae Sighting	Special Concern	CP.3 Cardinal-Proximate
Territorial Display	Special Concern	CP.3 Cardinal-Proximate

Common Name *Sable Clubtail* **BIOPID** 101

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Scarlet Bluet* **BIOPID** 106

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP.3 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP.3 Cardinal-Proximate
Larvae Sighting	Special Concern	CP.3 Cardinal-Proximate
Territorial Display	Special Concern	CP.3 Cardinal-Proximate

Common Name *Scarlet Bluet* **BIOPID** 107

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Septima's Clubtail* **BIOPID** 110

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Septima's Clubtail* **BIOPID** 111

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent

Occupied Habitat

Special Concern

LE.1 Limited Extent

Common Name *Ski-tipped Emerald***BIOPID****150**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Ski-tipped Emerald***BIOPID****151**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Spatterdock Darner***BIOPID****140**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Spatterdock Darner***BIOPID****141**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Subarctic Darner***BIOPID****144**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Superb Jewelwing***BIOPID****124**

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP*.4 Cardinal-Proximate
Exuviae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Larvae Sighting	State Threatened	CP*.4 Cardinal-Proximate
Territorial Display	State Threatened	CP*.4 Cardinal-Proximate

Common Name *Superb Jewelwing* **BIOPID** 125

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	State Threatened	LE.1 Limited Extent
Occupied Habitat	State Threatened	LE.1 Limited Extent

Common Name *Tiger Spiketail* **BIOPID** 96

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP.3 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP.3 Cardinal-Proximate
Larvae Sighting	Special Concern	CP.3 Cardinal-Proximate
Territorial Display	Special Concern	CP.3 Cardinal-Proximate

Common Name *Tiger Spiketail* **BIOPID** 97

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Two-spotted Skipper* **BIOPID** 14

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	State Threatened	CP.1 Cardinal-Proximate
Larvae Sighting	State Threatened	CP.1 Cardinal-Proximate
Pupae Sighting	State Threatened	CP.1 Cardinal-Proximate

Common Name *Two-spotted Skipper* **BIOPID** 15

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Casual Flyby	State Threatened	LE.1 Limited Extent
Nectaring	State Threatened	LE.1 Limited Extent

Common Name *Williamson's Emerald* **BIOPID** 148

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Common Name *Williamson's Emerald* **BIOPID** 149

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent

Common Name *Zebra Clubtail*

BIOPID

130

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Breeding/Courtship	Special Concern	CP*.4 Cardinal-Proximate
Exuviae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Larvae Sighting	Special Concern	CP*.4 Cardinal-Proximate
Territorial Display	Special Concern	CP*.4 Cardinal-Proximate

Class Mammalia

Common Name *Allegheny Woodrat*

BIOPID

219

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Capture Location	State Endangered	CA.1 Contiguous Area
Live Individual Sighting	State Endangered	CA.1 Contiguous Area
On Road	State Endangered	CA.1 Contiguous Area
Physical evidence	State Endangered	CA.1 Contiguous Area

Common Name *Big Brown Bat*

BIOPID

326

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Active Season Sighting	Special Concern	CA.1 Contiguous Area
Hibernaculum	Special Concern	CA.1 Contiguous Area
Inactive Season Sighting	Special Concern	CA.1 Contiguous Area
Maternity Colony	Special Concern	CA.1 Contiguous Area
Roost Site	Special Concern	CA.1 Contiguous Area

Common Name *Bobcat*

BIOPID

46

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Capture Location	State Threatened	CA*.1 Contiguous Area
Live Individual Sighting	State Threatened	CA*.1 Contiguous Area
On Road	State Threatened	CA*.1 Contiguous Area
Physical evidence	State Threatened	CA*.1 Contiguous Area
Telemetry: Home Range	State Threatened	CA*.1 Contiguous Area

Common Name *Bottlenose Dolphin*

BIOPID

316

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Calving or nursing area	Special Concern	LE.2 Limited Extent
Foraging Area	Special Concern	LE.2 Limited Extent
Large Pod Sighting	Special Concern	LE.2 Limited Extent
Live Individual Sighting	Special Concern	LE.2 Limited Extent

Small Pod Sighting

Special Concern

LE.2 Limited Extent

Common Name *Eastern Red Bat***BIOPID**

333

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Active Season Sighting	Special Concern	CA.1 Contiguous Area
Hibernaculum	Special Concern	CA.1 Contiguous Area
Inactive Season Sighting	Special Concern	CA.1 Contiguous Area
Maternity Colony	Special Concern	CA.1 Contiguous Area
Roost Site	Special Concern	CA.1 Contiguous Area

Common Name *Eastern Small-footed Myotis***BIOPID**

330

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Active Season Sighting	State Endangered	CA.1 Contiguous Area
Hibernaculum	State Endangered	CA.1 Contiguous Area
Inactive Season Sighting	State Endangered	CA.1 Contiguous Area
Maternity Colony	State Endangered	CA.1 Contiguous Area
Roost Site	State Endangered	CA.1 Contiguous Area

Common Name *Fin Whale***BIOPID**

256

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging Area	State Endangered	LE.2 Limited Extent
Live Individual Sighting	State Endangered	LE.2 Limited Extent

Common Name *Harbor Porpoise***BIOPID**

317

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging Area	Special Concern	LE.2 Limited Extent
Large Pod Sighting	Special Concern	LE.2 Limited Extent
Live Individual Sighting	Special Concern	LE.2 Limited Extent
Small Pod Sighting	Special Concern	LE.2 Limited Extent

Common Name *Humpback Whale***BIOPID**

257

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging Area	State Endangered	LE.2 Limited Extent
Live Individual Sighting	State Endangered	LE.2 Limited Extent

Common Name *Indiana Myotis***BIOPID**

229

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Active Season Sighting	State Endangered	CA.1 Contiguous Area
Hibernaculum	State Endangered	CA.1 Contiguous Area

Inactive Season Sighting	State Endangered	CA.1 Contiguous Area
Maternity Colony	State Endangered	CA.1 Contiguous Area
Roost Site	State Endangered	CA.1 Contiguous Area

Common Name *Little Brown Myotis* **BIOPID** 332

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Active Season Sighting	State Endangered	CA.1 Contiguous Area
Hibernaculum	State Endangered	CA.1 Contiguous Area
Inactive Season Sighting	State Endangered	CA.1 Contiguous Area
Maternity Colony	State Endangered	CA.1 Contiguous Area
Roost Site	State Endangered	CA.1 Contiguous Area

Common Name *Meadow Jumping Mouse* **BIOPID** 329

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Capture Location	Special Concern	CA.1 Contiguous Area
Live Individual Sighting	Special Concern	CA.1 Contiguous Area
On Road	Special Concern	CA.1 Contiguous Area
Physical evidence	Special Concern	CA.1 Contiguous Area

Common Name *North Atlantic Right Whale* **BIOPID** 258

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Foraging Area	State Endangered	LE.2 Limited Extent
Live Individual Sighting	State Endangered	LE.2 Limited Extent

Common Name *Northern Hoary Bat* **BIOPID** 331

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Active Season Sighting	Special Concern	CA.1 Contiguous Area
Hibernaculum	Special Concern	CA.1 Contiguous Area
Inactive Season Sighting	Special Concern	CA.1 Contiguous Area
Maternity Colony	Special Concern	CA.1 Contiguous Area
Roost Site	Special Concern	CA.1 Contiguous Area

Common Name *Northern Myotis* **BIOPID** 290

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Active Season Sighting	State Endangered	CA.1 Contiguous Area
Hibernaculum	State Endangered	CA.1 Contiguous Area
Inactive Season Sighting	State Endangered	CA.1 Contiguous Area
Maternity Colony	State Endangered	CA.1 Contiguous Area

Roost Site

State Endangered

CA.1 Contiguous Area

Common Name *Silver-haired Bat***BIOPID**

334

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Active Season Sighting	Special Concern	CA.1 Contiguous Area
Hibernaculum	Special Concern	CA.1 Contiguous Area
Inactive Season Sighting	Special Concern	CA.1 Contiguous Area
Maternity Colony	Special Concern	CA.1 Contiguous Area
Roost Site	Special Concern	CA.1 Contiguous Area

Common Name *Tricolored Bat***BIOPID**

335

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Active Season Sighting	State Endangered	CA.1 Contiguous Area
Hibernaculum	State Endangered	CA.1 Contiguous Area
Inactive Season Sighting	State Endangered	CA.1 Contiguous Area
Maternity Colony	State Endangered	CA.1 Contiguous Area
Roost Site	State Endangered	CA.1 Contiguous Area

Class Petromyzontida**Common Name** *American Brook Lamprey***BIOPID**

367

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Occupied Habitat	Special Concern	SC Stream Centerline

Class Reptilia**Common Name** *Bog Turtle***BIOPID**

206

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Hibernaculum	State Endangered	CA*.3 Contiguous Area
Occupied Habitat	State Endangered	CA*.3 Contiguous Area
On Road	State Endangered	CA*.3 Contiguous Area

Common Name *Eastern Copperhead***BIOPID**

44

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Gestation Site	State Threatened	CA.1 Contiguous Area
Hibernaculum	State Threatened	CA.1 Contiguous Area
Occupied Habitat	State Threatened	CA.1 Contiguous Area
Occurrence by Den	State Threatened	CA.1 Contiguous Area
On Road	State Threatened	CA.1 Contiguous Area

Telemetry: Home Range	State Threatened	CA.1 Contiguous Area
Telemetry: Partial Activity Range	State Threatened	CA.1 Contiguous Area

Common Name *Eastern Hog-nosed Snake* **BIOPID** 308

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Hibernaculum	Special Concern	CA.1 Contiguous Area
Nesting Area	Special Concern	CA.1 Contiguous Area
Occupied Habitat	Special Concern	CA.1 Contiguous Area
Occurrence by Den	Special Concern	CA.1 Contiguous Area
On Road	Special Concern	CA.1 Contiguous Area
Telemetry: Home Range	Special Concern	CA.1 Contiguous Area
Telemetry: Partial Activity Range	Special Concern	CA.1 Contiguous Area

Common Name *Eastern Kingsnake* **BIOPID** 281

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Gestation Site	Special Concern	CA.1 Contiguous Area
Hibernaculum	Special Concern	CA.1 Contiguous Area
Nesting Area	Special Concern	CA.1 Contiguous Area
Occupied Habitat	Special Concern	CA.1 Contiguous Area
Occurrence by Den	Special Concern	CA.1 Contiguous Area
On Road	Special Concern	CA.1 Contiguous Area
Telemetry: Home Range	Special Concern	CA.1 Contiguous Area
Telemetry: Partial Activity Range	Special Concern	CA.1 Contiguous Area

Common Name *Eastern Smooth Earthsnake* **BIOPID** 312

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Hibernaculum	Special Concern	LE.1 Limited Extent
Nesting Area	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent
Occurrence by Den	Special Concern	LE.1 Limited Extent
On Road	Special Concern	LE.1 Limited Extent
Telemetry: Home Range	Special Concern	LE.1 Limited Extent
Telemetry: Partial Activity Range	Special Concern	LE.1 Limited Extent

Common Name *Green Sea Turtle* **BIOPID** 259

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Marine Telemetry: Partial Activity Range	State Endangered	LE.2 Limited Extent
Occupied Habitat	State Endangered	LE.2 Limited Extent

Common Name *Kemp's Ridley Sea Turtle* **BIOPID** 261

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Marine Telemetry: Partial Activity Range	State Endangered	LE.2 Limited Extent
Occupied Habitat	State Endangered	LE.2 Limited Extent

Common Name *Leatherback Sea Turtle* **BIOPID** 262

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Marine Telemetry: Partial Activity Range	State Endangered	LE.2 Limited Extent
Occupied Habitat	State Endangered	LE.2 Limited Extent

Common Name *Little Brown Skink* **BIOPID** 354

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Nesting Area	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent
On Road	Special Concern	LE.1 Limited Extent

Common Name *Loggerhead Sea Turtle* **BIOPID** 260

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Marine Telemetry: Partial Activity Range	State Endangered	LE.2 Limited Extent
Occupied Habitat	State Endangered	LE.2 Limited Extent

Common Name *Northern Diamond-backed Terrapin* **BIOPID** 336

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Hibernaculum	Special Concern	LE.1 Limited Extent
Nesting Area	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent
On Road	Special Concern	LE.1 Limited Extent

Common Name *Northern Pinesnake* **BIOPID** 232

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Gestation Site	State Threatened	CA.1 Contiguous Area
Hibernaculum	State Threatened	CA.1 Contiguous Area

Nesting Area	State Threatened	CA.1 Contiguous Area
Occupied Habitat	State Threatened	CA.1 Contiguous Area
Occurrence by Den	State Threatened	CA.1 Contiguous Area
On Road	State Threatened	CA.1 Contiguous Area
Telemetry: Home Range	State Threatened	CA.1 Contiguous Area
Telemetry: Partial Activity Range	State Threatened	CA.1 Contiguous Area

Common Name *Northern Scarletsnake* **BIOPID** 311

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Hibernaculum	State Threatened	CA.1 Contiguous Area
Nesting Area	State Threatened	CA.1 Contiguous Area
Occupied Habitat	State Threatened	CA.1 Contiguous Area
Occurrence by Den	State Threatened	CA.1 Contiguous Area
On Road	State Threatened	CA.1 Contiguous Area
Telemetry: Home Range	State Threatened	CA.1 Contiguous Area
Telemetry: Partial Activity Range	State Threatened	CA.1 Contiguous Area

Common Name *Queensnake* **BIOPID** 278

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Gestation Site	State Endangered	CA*.4 Contiguous Area
Hibernaculum	State Endangered	CA*.4 Contiguous Area
Nesting Area	State Endangered	CA*.4 Contiguous Area
Occupied Habitat	State Endangered	CA*.4 Contiguous Area
Occurrence by Den	State Endangered	CA*.4 Contiguous Area
On Road	State Endangered	CA*.4 Contiguous Area
Telemetry: Home Range	State Endangered	CA*.4 Contiguous Area
Telemetry: Partial Activity Range	State Endangered	CA*.4 Contiguous Area

Common Name *Red Cornsnake* **BIOPID** 254

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Gestation Site	State Endangered	CP*.3 Cardinal-Proximate
Hibernaculum	State Endangered	CP*.3 Cardinal-Proximate
Nesting Area	State Endangered	CP*.3 Cardinal-Proximate
Occupied Habitat	State Endangered	CP*.3 Cardinal-Proximate
Occurrence by Den	State Endangered	CP*.3 Cardinal-Proximate

On Road	State Endangered	CP*.3 Cardinal-Proximate
Telemetry: Home Range	State Endangered	CP*.3 Cardinal-Proximate
Telemetry: Partial Activity Range	State Endangered	CP*.3 Cardinal-Proximate

Common Name ***Rough Greensnake*** **BIOPID** 309

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Hibernaculum	Special Concern	CP*.1 Cardinal-Proximate
Nesting Area	Special Concern	CP*.1 Cardinal-Proximate
Occupied Habitat	Special Concern	CP*.1 Cardinal-Proximate
Occurrence by Den	Special Concern	CP*.1 Cardinal-Proximate
On Road	Special Concern	CP*.1 Cardinal-Proximate
Telemetry: Home Range	Special Concern	CP*.1 Cardinal-Proximate
Telemetry: Partial Activity Range	Special Concern	CP*.1 Cardinal-Proximate

Common Name ***Smooth Greensnake*** **BIOPID** 310

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Hibernaculum	Special Concern	CP.*6 Cardinal-Proximate
Nesting Area	Special Concern	CP.*6 Cardinal-Proximate
Occupied Habitat	Special Concern	CP.*6 Cardinal-Proximate
Occurrence by Den	Special Concern	CP.*6 Cardinal-Proximate
On Road	Special Concern	CP.*6 Cardinal-Proximate
Telemetry: Home Range	Special Concern	CP.*6 Cardinal-Proximate
Telemetry: Partial Activity Range	Special Concern	CP.*6 Cardinal-Proximate

Common Name ***Spotted Turtle*** **BIOPID** 282

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Hibernaculum	Special Concern	LE.1 Limited Extent
Nesting Area	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent
On Road	Special Concern	LE.1 Limited Extent
Vernal Pool	Special Concern	LE.1 Limited Extent

Common Name ***Timber Rattlesnake*** **BIOPID** 45

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Gestation Site (North)	State Endangered	CA.1 Contiguous Area
Hibernaculum (North)	State Endangered	CA.1 Contiguous Area

Nesting Area (North)	State Endangered	CA.1 Contiguous Area
Occupied Habitat (North)	State Endangered	CA.1 Contiguous Area
Occurrence by Den (North)	State Endangered	CA.1 Contiguous Area
On Road (North)	State Endangered	CA.1 Contiguous Area
Telemetry: Home Range (North)	State Endangered	CA.1 Contiguous Area
Telemetry: Partial Activity Range (North)	State Endangered	CA.1 Contiguous Area

Common Name *Timber Rattlesnake* **BIOPID** 284

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Gestation Site (South)	State Endangered	CA.1 Contiguous Area
Hibernaculum (South)	State Endangered	CA.1 Contiguous Area
Nesting Area (South)	State Endangered	CA.1 Contiguous Area
Occupied Habitat (South)	State Endangered	CA.1 Contiguous Area
Occurrence by Den (South)	State Endangered	CA.1 Contiguous Area
On Road (South)	State Endangered	CA.1 Contiguous Area
Telemetry: Home Range (South)	State Endangered	CA.1 Contiguous Area
Telemetry: Partial Activity Range (South)	State Endangered	CA.1 Contiguous Area

Common Name *Wood Turtle* **BIOPID** 196

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Hibernaculum	State Threatened	LE.3 Limited Extent
Nesting Area	State Threatened	LE.3 Limited Extent
Occupied Habitat	State Threatened	LE.3 Limited Extent
On Road	State Threatened	LE.3 Limited Extent
Vernal Pool	State Threatened	LE.3 Limited Extent

Common Name *Woodland Box Turtle* **BIOPID** 233

<i>Feature Label</i>	<i>NJ Status</i>	<i>Patch Type</i>
Hibernaculum	Special Concern	LE.1 Limited Extent
Nesting Area	Special Concern	LE.1 Limited Extent
Occupied Habitat	Special Concern	LE.1 Limited Extent
On Road	Special Concern	LE.1 Limited Extent
Vernal Pool Non-breeding	Special Concern	LE.1 Limited Extent

Land Use Land Cover Selections and Patch Type Justifications

Atlantic Sturgeon

BIOPID 264

REGION Statewide

PATCH TYPE LE.2 Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5100	STREAMS AND CANALS	Undissolved	<i>1,2</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1,2</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1,2</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1,2</i>
5430	ATLANTIC OCEAN	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Atlantic sturgeon are an anadromous fish, thus inhabiting both freshwater and marine environments, from Canada to Florida. However, its range within New Jersey is mostly restricted to the Delaware River, Hudson River, Raritan Bay, Delaware Bay, and adjacent coastlines (Stein et al. 2004). After hatching in tidal rivers and bays, juveniles head out to marine coastal waters before returning to freshwater rivers as adults to spawn in the spring and early summer (Stein et al. 2004). Male sturgeon will remain in tidal rivers and bays until fall after spawning, while females will egress from rivers 1 – 2 months after spawning. Newly hatched larvae will drift along these rivers into tidal bays which they will inhabit for 1 – 5 years, before moving to coastal marine waters until mature (NOAA Fisheries 2024). Therefore, the species overall will utilize several Land Use/Land Cover habitats for different periods of its life history, including tidal rivers, inland bays, and other tidal waters for spawning and then open tidal bays and the Atlantic Ocean for subadult and adult life stages. There is no documented evidence that supports that the species will utilize streams and canals or tidal mud flats, only the other aforementioned areas.

Literature Citations

1. Stein, A. B., Friedland, K. D., & Sutherland, M. (2004). Atlantic Sturgeon Marine Distribution and habitat use along the northeastern coast of the United States. *Transactions of the American Fisheries Society*, 133(3), 527–537. <https://doi.org/10.1577/t02-151.1>
2. NOAA Fisheries. (2024, September 25). *Species Directory, Atlantic Sturgeon*. <https://www.fisheries.noaa.gov/species/atlantic-sturgeon/overview>

Land Use Land Cover Selections and Patch Type Justifications

Blackbanded Sunfish

BIOPID 368

REGION Statewide

PATCH TYPE SC Stream Centerline

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved	<i>1,2,3,4,5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Blackbanded Sunfish are found in slow-moving streams and ponds with low turbidity and plenty of vegetation. Movement or dispersal behavior of Blackbanded Sunfish has not been well documented or studied extensively. However, Blackbanded Sunfish are found in streams and lakes/ponds in NJ. Due to their presence in both streams or lakes/ponds, stream centerlines and waterbody polygons were used to represent suitable habitat.

Stream segments intersected by a Blackbanded Sunfish SOA, were valued for that SOA. All valued streams were buffered by 1 km upstream and downstream. The 1 km distance was chosen as a conservative buffer estimate and based on literature review of movement and dispersal patterns of Blackbanded Sunfish. NatureServe mapping guidance state that if there are two occurrences within 10 km of each other these occurrences should be considered as part of the same local population regardless of habitat quality and stream segments between those occurrences were valued. Stream segments, 1 km upstream of tributaries that exist in between two occurrences, were also valued regardless of habitat quality. Lakes or ponds intersected by a Blackbanded Sunfish SOA, were valued for that SOA, as Blackbanded Sunfish are found in both slow-moving streams and ponds. However, waterbodies located upstream of a Blackbanded SOA were considered barriers to upstream movement as they often represent dams lacking a suitable fishway, a high waterfall, or upland habitat and therefore the extent of stream valued was limited (Hammerson 2004). Waterbody polygons located downstream and intersecting a Blackbanded Sunfish SOA, or located between two occurrences within 10 km of each other, were valued. Stream segments that represented inlets or outlets, associated with valued waterbody polygons, were valued 1 km upstream of inlets or 1 km downstream of outlets.

Some stream centerline data overlapped Blackbanded Sunfish SOA data that occurred in proximity (e.g. in another drainage area), but not related to a documented occurrence. It was necessary to manually remove these segments.

Literature Citations

1. Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for Sunfishes (Centrarchids).
2. Irmischer, P. & C.C. Vaughn. 2015. Limited movement of freshwater mussel fish hosts in a southern US river. *Hydrobiologia*. 757:223-233.
3. Minns, C.K. 1995. Allometry of home range size in lake and river fishes. *Canadian Journal of Fisheries and Aquatic Sciences*. 52:1499-1508.
4. Paukert, C.P., D.W. Willis, and M.A. Bouchard. 2004. Movement, home range, and site fidelity of bluegills in a Great Plains Lake. *North American Journal of Fisheries Management*. 24:154-161.
5. Smithson, E.B. and C.E. Johnston. 1999. Movement patterns of stream fishes in a Ouachita Highlands Stream: An examination of the restricted movement paradigm. *Transactions of the American Fisheries Society*. 128:847-853.

Land Use Land Cover Selections and Patch Type Justifications

Bridle Shiner *BIOPID* 369 *REGION* Statewide *PATCH TYPE* SC Stream Centerline

LU20 *LABEL 20* *LULC TREATMENT* *CITATIONS*

8888 STREAM CENTERLINE Undissolved *1,2,3*

Land Use - Land Cover Selection and Patch Type Rationale

Bridle Shiners prefer clear, slow-moving waters with submerged vegetation (Horwitz 1985). They're generally weak swimmers and can be found locally abundant swimming in groups. Due to their presence in both streams or lakes/ponds, stream centerlines and waterbody polygons were used to represent suitable habitat.

Stream segments intersected by a Bridle Shiner SOA, were valued for that SOA. All valued streams were buffered by 1 km upstream and downstream. The 1 km distance was chosen as a conservative buffer estimate and based on literature review of movement and dispersal patterns of Bridle Shiner. NatureServe mapping guidance state that if there are two occurrences within 10 km of each other these occurrences should be considered as part of the same local population regardless of habitat quality and stream segments between those occurrences were valued. Stream segments, 1 km upstream of tributaries that exist in between two occurrences, were also valued regardless of habitat quality. Lakes or ponds intersected by a Bridle Shiner SOA, were valued for that SOA, as Bridle Shiner are found in both slow-moving streams and ponds. However, waterbodies located upstream of a Bridle Shiner SOA were considered barriers to upstream movement as they often represent dams lacking a suitable fishway, a high waterfall, or upland habitat and therefore the extent of stream valued was limited (Hammerson 2004). Waterbody polygons located downstream and intersecting a Bridle Shiner SOA, or located between two occurrences within 10 km of each other, were valued. Stream segments that represented inlets or outlets, associated with valued waterbody polygons, were valued 1 km upstream of inlets or 1 km downstream of outlets.

Some stream centerline data overlapped Bridle Shiner SOA data that occurred in proximity (e.g. in another drainage area), but not related to a documented occurrence. It was necessary to manually remove these segments.

Literature Citations

1. Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for small cyprinids.
2. Horwitz R.J. 1985. Status of the bridge shiner, *Notropis bifrenatus* in Pennsylvania. Species of Special Concern Special Publication Carnegie Museum Natural History 11:190–193
3. Jensen, T. 2012. Movement, Habitat Use and Detection Probability of Bridge Shiner Estimated by Patch Occupancy Modeling in a Connecticut Watershed. Master's Theses. 336.

Land Use Land Cover Selections and Patch Type Justifications

<i>Comely Shiner</i>		<i>BIOPID</i> 365	<i>REGION</i> Statewide	<i>PATCH TYPE</i> SC Stream Centerline
<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>		<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved		<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Movement or dispersal information on the Comely Shiner is limited but it is noted that they will tolerate a wide range of currents, although it avoids very fast water of riffles (Cooper 1983). Feeding strategies, spawning behaviors, and range-wide distributions reflect the need for healthy river and stream habitat. Therefore, stream centerlines were used to represent suitable habitat.

Stream segments intersected by a Comely Shiner SOA, were valued for that SOA. All valued streams were buffered by 1 km upstream and downstream. The 1 km distance was chosen as a conservative buffer estimate and based on literature review of movement and dispersal patterns of Comely Shiner. NatureServe mapping guidance state that if there are two occurrences within 10 km of each other these occurrences should be considered as part of the same local population regardless of habitat quality and stream segments between those occurrences were valued. Stream segments, 1 km upstream of tributaries that exist in between two occurrences, were also valued regardless of habitat quality. Stream segments that intersected with waterbodies located upstream were considered barriers to upstream movement as they often represent dams lacking a suitable fishway, a high waterfall, and upland habitat are considered barriers; therefore the extent of stream valued was limited (Hammerson 2004). The extent of habitat valued was limited in a downstream direction when an SOA, originating upstream, intersected a lake or pond. The lake or pond represents a change in habitat or habitat that is atypical of Comely Shiner occurrence. Although uncommon, SOAs representing Comely Shiner occurrences in lakes or ponds were valued for that polygon representing the lake or pond. Stream segments that represented inlets or outlets, associated with valued waterbody polygons, were valued 1 km upstream of inlets or 1 km downstream of outlets.

Some stream centerline data overlapped Comely Shiner SOA data that occurred in proximity (e.g. in another drainage area), but not related to a documented occurrence. It was necessary to manually remove these segments.

Literature Citations

1. Cooper, E.L. 1983. Fishes of Pennsylvania. Pennsylvania State University Press, University Park, PA.
2. Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for small cyprinids.

Land Use Land Cover Selections and Patch Type Justifications

<i>Ironcolor Shiner</i>		<i>BIOPID</i> 362	<i>REGION</i> Statewide	<i>PATCH TYPE</i> SC Stream Centerline
<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>		<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved		<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Ironcolor Shiners prefer clear, heavily vegetated water, sand-bottomed pools, and slow-moving streams. Movements of the Ironcolor Shiner are quite limited but generally related to changes in the bottom contours, water level, and sources of available food (Marshall 1947). Due to their presence in both streams or lakes/ponds, stream centerlines and waterbody polygons were used to represent suitable habitat.

Stream segments intersected by an Ironcolor Shiner SOA, were valued for that SOA. All valued streams were buffered by 1 km upstream and downstream. The 1 km distance was chosen as a conservative buffer estimate and based on literature review of movement and dispersal patterns of Ironcolor Shiner. NatureServe mapping guidance state that if there are two occurrences within 10 km of each other these occurrences should be considered as part of the same local population regardless of habitat quality and stream segments between those occurrences were valued. Stream segments, 1 km upstream of tributaries that exist in between two occurrences, were also valued regardless of habitat quality. Lakes or ponds intersected by an Ironcolor Shiner SOA, were valued for that SOA, as Ironcolor Shiner are found in both slow-moving streams and ponds. However, waterbodies located upstream of an Ironcolor Shiner SOA were considered barriers to upstream movement as they often represent dams lacking a suitable fishway, a high waterfall, or upland habitat and therefore the extent of stream valued was limited (Hammerson 2004). Waterbody polygons located downstream and intersecting an Ironcolor Shiner SOA, or located between two occurrences within 10 km of each other, were valued. Stream segments that represented inlets or outlets, associated with valued waterbody polygons, were valued 1 km upstream of inlets or 1 km downstream of outlets.

Some stream centerline data overlapped Ironcolor Shiner SOA data that occurred in proximity (e.g. in another drainage area), but not related to a documented occurrence. It was necessary to manually remove these segments.

Literature Citations

1. Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for small cyprinids.
2. Horwitz R.J. 1985. Status of the bridge shiner, *Notropis bifrenatus* in Pennsylvania. Species of Special Concern Special Publication Carnegie Museum Natural History 11:190–193
3. Jensen, T. 2012. Movement, Habitat Use and Detection Probability of Bridge Shiner Estimated by Patch Occupancy Modeling in a Connecticut Watershed. Master's Theses. 336.

Land Use Land Cover Selections and Patch Type Justifications

Mud Sunfish *BIOPID* 370 *REGION* Statewide *PATCH TYPE* SC Stream Centerline

LU20 *LABEL 20* *LULC TREATMENT* *CITATIONS*

8888 STREAM CENTERLINE Undissolved *1,2,3*

Land Use - Land Cover Selection and Patch Type Rationale

Mud Sunfish are found in slow-moving streams and ponds or swamps which are highly vegetated. They inhabit both tidal and nontidal waters (Cooper 1983; Raasch 1997). In New Jersey, their range is restricted primarily to the southern portion of the state. Mud Sunfish are found in streams and lakes/ponds in NJ. Due to their presence in both streams or lakes/ponds, stream centerlines and waterbody polygons were used to represent suitable habitat.

Stream segments intersected by a Mud Sunfish SOA, were valued for that SOA. All valued streams were buffered by 1 km upstream and downstream. The 1 km distance was chosen as a conservative buffer estimate and based on literature review of movement and dispersal patterns of Mud Sunfish. NatureServe mapping guidance state that if there are two occurrences within 10 km of each other these occurrences should be considered as part of the same local population regardless of habitat quality and stream segments between those occurrences were valued. Stream segments, 1 km upstream of tributaries that exist in between two occurrences, were also valued regardless of habitat quality. Lakes or ponds intersected by a Mud Sunfish SOA, were valued for that SOA, as Mud Sunfish are found in both slow-moving streams and ponds. However, waterbodies located upstream of a Mud Sunfish SOA were considered barriers to upstream movement as they often represent dams lacking a suitable fishway, a high waterfall, or upland habitat and therefore the extent of stream valued was limited (Hammerson 2004). Waterbody polygons located downstream and intersecting a Mud Sunfish SOA, or located between two occurrences within 10 km of each other, were valued. Stream segments that represented inlets or outlets, associated with valued waterbody polygons, were valued 1 km upstream of inlets or 1 km downstream of outlets.

Some stream centerline data overlapped Mud Sunfish SOA data that occurred in proximity (e.g. in another drainage area), but not related to a documented occurrence. It was necessary to manually remove these segments.

Literature Citations

1. Cooper, E. L. 1983. Fishes of Pennsylvania and the northeastern United States. Pennsylvania State University Press, University Park. 243 p.
2. Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for Sunfishes (Centrarchids).
3. Raasch, M. 1997. Delaware's Freshwater and Brackish-Water Fishes – A popular account. 3rd edition.

Land Use Land Cover Selections and Patch Type Justifications

<i>Northern Hog Sucker</i>		<i>BIOPID</i> 363	<i>REGION</i> Statewide	<i>PATCH TYPE</i> SC Stream Centerline
<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>		<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved		<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Northern Hog Suckers prefer clean, cool-water stream and seek riffles with clean gravel (Carlson and Carlson 2022; Steiner 2011). New Jersey represents a southern portion of its range, where it exists in the Delaware River and a few medium sized streams that drain into the Delaware River. Feeding strategies, spawning behaviors, and range-wide distributions reflect the need for healthy river and stream habitat. Therefore, stream centerlines were used to represent suitable habitat.

Stream segments intersected by a Northern Hog Sucker SOA, were valued for that SOA. All valued streams were buffered by 1 km upstream and downstream. The 1 km distance was chosen as a conservative buffer estimate and based on literature review of movement and dispersal patterns of Northern Hog Sucker. NatureServe mapping guidance state that if there are two occurrences within 15 km of each other these occurrences should be considered as part of the same local population regardless of habitat quality and stream segments between those occurrences were valued. Stream segments, 1 km upstream of tributaries that exist in between two occurrences, were also valued regardless of habitat quality. Stream segments that intersected with waterbodies located upstream were considered barriers to upstream movement as they often represent dams lacking a suitable fishway, a high waterfall, and upland habitat are considered barriers; therefore the extent of stream valued was limited (Hammerson 2004). The extent of habitat valued was limited in a downstream direction when an SOA, originating upstream, intersected a lake or pond. The lake or pond represents a change in habitat or habitat that is atypical of Northern Hog Sucker occurrence. SOAs representing Northern Hog Sucker occurrences in lakes or ponds were valued for that polygon representing the lake or pond. Although uncommon, SOAs representing Northern Hog Sucker occurrences in lakes or ponds were valued for that polygon representing the lake or pond. Stream segments that represented inlets or outlets, associated with valued waterbody polygons, were valued 1 km upstream of inlets or 1 km downstream of outlets.

Some stream centerline data overlapped Northern Hog Sucker SOA data that occurred in proximity (e.g. in another drainage area), but not related to a documented occurrence. It was necessary to manually remove these segments.

Literature Citations

1. Carlson, D.M. and J.E. Carlson. 2022. Fishes of Northern New York and the Adirondacks. Northeastern Naturalist, 29(Monograph 21):1-46.
2. Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for medium suckers.
3. Steiner, L. 2011. Pennsylvania Fishes. Pennsylvania Fish and Boat Commission. 170 p.

Land Use Land Cover Selections and Patch Type Justifications

Shield Darter *BIOPID* 366 *REGION* Statewide *PATCH TYPE* SC Stream Centerline

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>

8888	STREAM CENTERLINE	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Shield Darters may move among mesohabitats to acquire resources but are generally restricted by isolation to riffle habitat and predator density in pools (Roberts and Angermeier 2007). However, larvae of almost all members of the *Percina* genus drift for long distances downstream. Feeding strategies, spawning behaviors, and range-wide distributions reflect the need for healthy river and stream habitat. Therefore, stream centerlines were used to represent suitable habitat.

Stream segments intersected by a Shield Darters SOA, were valued for that SOA. All valued streams were buffered by 1 km upstream and downstream. The 1 km distance was chosen as a conservative buffer estimate and based on literature review of movement and dispersal patterns of Shield Darter. NatureServe mapping guidance state that if there are two occurrences within 10 km of each other these occurrences should be considered as part of the same local population regardless of habitat quality and stream segments between those occurrences were valued. Stream segments, 1 km upstream of tributaries that exist in between two occurrences, were also valued regardless of habitat quality. Stream segments that intersected with waterbodies located upstream were considered barriers to upstream movement as they often represent dams lacking a suitable fishway, a high waterfall, and upland habitat are considered barriers; therefore the extent of stream valued was limited (Hammerson 2004). The extent of habitat valued was limited in a downstream direction when an SOA, originating upstream, intersected a lake or pond. The lake or pond represents a change in habitat or habitat that is atypical of Shield Darter occurrence. Although uncommon, SOAs representing Shield Darter occurrences in lakes or ponds were valued for that polygon representing the lake or pond. Stream segments that represented inlets or outlets, associated with valued waterbody polygons, were valued 1 km upstream of inlets or 1 km downstream of outlets.

Some stream centerline data overlapped Shield Darter SOA data that occurred in proximity (e.g. in another drainage area), but not related to a documented occurrence. It was necessary to manually remove these segments.

Literature Citations

1. Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation darters.
2. Roberts, J.H. and P.L. Angermeier. 2007. Spatiotemporal variability of stream habitat and movement of three species of fish. *Oecologia* 151:417-430.

Land Use Land Cover Selections and Patch Type Justifications

Shortnose Sturgeon

BIOPID 263

REGION Statewide

PATCH TYPE LE.2 Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5100	STREAMS AND CANALS	Undissolved	<i>1,2,3</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1,2,3</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1,2,3</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Shortnose sturgeon inhabit both freshwater and marine environments from Canada to Florida. However, its range within New Jersey is restricted to the Delaware River, Hudson River and Delaware Bay (Dadswell et al. 1984). Although there is anecdotal information that suggests shortnose sturgeon once utilized portions of several Delaware River tributaries, recent evidence confirming species' occurrences in these areas is lacking. To date, there is only one confirmed observation of a shortnose sturgeon at the mouth of one Delaware River tributary (Boriek pers. comm. 2005).

This species is amphidromous – meaning they are born in freshwater and live in their natal freshwater rivers; however, they may also make short feeding or migratory visits to salt water before returning to freshwater (NOAA 2024). Spawning adults migrate far upstream in the spring to spawn. After spawning, adults move rapidly back downstream into tidal estuaries to live before making additional spawning runs in subsequent years. Larvae spend short time in the freshwater as well, drifting back down to tidal estuaries quickly after birth (NOAA 2024). Therefore, the species overall will utilize Land Use/Land Cover habitats for different periods of its life history, including streams and canals for breeding, and tidal rivers, inland bays, and open tidal bays as adults. There is no evidence of use of tidal mud flats by the species, and its interaction within the Atlantic Ocean is slim.

Literature Citations

1. Boriek, M. 2005. Personal Communication. New Jersey Department of Environmental Protection, Division of Fish and Wildlife.
2. Dadswell, M.J., B.D. Taulbert, T.S. Squiers, D. Marchette and J. Buckley. 1984. NOAA Technical Report NMFS 14: Synopsis of Biological Data on Shortnose Sturgeon, *Acipenser brevirostrum* LeSueur 1818. FAO Fisheries Synopsis No. 140.
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Land Use Land Cover Selections and Patch Type Justifications

Slimy Sculpin

BIOPID 364

REGION Statewide

PATCH TYPE SC Stream Centerline

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Slimy Sculpin is a small fish with movement limited by their affinity to instream cover, such as cobble (Gray et al. 2004), stream bed stability and stream temperature (Edwards and Cunjak 2007). In New Jersey, they are a bottom-dwelling fish found in coldwater streams, almost always associated with wild trout. Feeding strategies, spawning behaviors, and range-wide distributions reflect the need for healthy river and stream habitat. Therefore, stream centerlines were used to represent suitable habitat.

Stream segments intersected by a Slimy Sculpin SOA, were valued for that SOA. All valued streams were buffered by 1 km upstream and downstream. The 1 km distance was chosen as a conservative buffer estimate and based on literature review of movement and dispersal patterns of Slimy Sculpin. NatureServe mapping guidance state that if there are two occurrences within 10 km of each other these occurrences should be considered as part of the same local population regardless of habitat quality and stream segments between those occurrences were valued. Stream segments, 1 km upstream of tributaries that exist in between two occurrences, were also valued regardless of habitat quality. Stream segments that intersected with waterbodies located upstream were considered barriers to upstream movement as they often represent dams lacking a suitable fishway, a high waterfall, and upland habitat are considered barriers; therefore the extent of stream valued was limited (Hammerson 2004). The extent of habitat valued was limited in a downstream direction when an SOA, originating upstream, intersected a lake or pond. The lake or pond represents a change in habitat or habitat that is atypical of Slimy Sculpin occurrence. Although uncommon, SOAs representing Slimy Sculpin occurrences in lakes or ponds were valued for that polygon representing the lake or pond. Stream segments that represented inlets or outlets, associated with valued waterbody polygons, were valued 1 km upstream of inlets or 1 km downstream of outlets.

Some stream centerline data overlapped Slimy Sculpin SOA data that occurred in proximity (e.g. in another drainage area), but not related to a documented occurrence. It was necessary to manually remove these segments.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Blue-spotted Salamander

BIOPID 207

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	2-5
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	2-5
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	2-5
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved and Adjacent Undissolved	2-5
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved and Adjacent Undissolved	2-5
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	2-5
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	2-5
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2-5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	2-5
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2-5
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	2-5
4230	PLANTATION	Undissolved	2-5
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	2-5

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	2-5
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	2-5
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	2-5
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	2-5
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	2-5
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	2-5
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2-5
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2-5
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	2-5
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	2-5
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	2-5
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	2-5
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2-5
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2-5
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	2-5

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	2-5
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	2-5
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	2-5

Land Use - Land Cover Selection and Patch Type Rationale

Blue-spotted salamanders (*Ambystoma laterale*) breed in fish-free ponds, often defined as vernal pools, in New Jersey (Anderson and Giacosis 1967). Much of each species' distribution is within 300-meters of a breeding habitat, although individuals will disperse outside of this range (Regosin et al. 2005). Vernal pools, a type of ephemeral wetland, are identified in the LULC as various wetland and forest classes and are a critical component to the persistence of this salamander. Many types of non-urban land use classes, primarily deciduous forest and deciduous wooded wetlands, surrounding a vernal pool will serve as the non-breeding habitat (Faccio 2003, Regosin et al. 2005).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for marbled salamander. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Carpenter Frog

BIOPID 255

REGION Statewide

PATCH TYPE CP*.5 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1,2,3</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>

5200	NATURAL LAKES	Undissolved	<i>1,2,3</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1,2,3</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

From Conant and Collins: Sometimes called the “sphagnum frog” because of a close association with sphagnum bogs. It may also be found in stands of emergent grasslike vegetation. This species is found in the Atlantic Coastal Plain ranging from the New Jersey Pine Barrens to southern Georgia. They prefer tea colored, still water with an abundance of aquatic vegetation (NatureServe 2015). Additionally, they have adapted to high acidic levels in water.

Because of their limited dispersal ability patch type Cardinal-Proximate is the best model to capture the species’ critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of carpenter frogs from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for carpenter frogs. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Cope's Gray Treefrog

BIOPID 230

REGION Statewide

PATCH TYPE CP*.5 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1,2,3,4</i>
1499	STORMWATER BASIN	Undissolved	<i>1,2,3,4</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1,2,3,4</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1,2,3,4</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>

4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1,2,3,4</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1,2,3,4</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
5200	NATURAL LAKES	Undissolved	<i>1,2,3,4</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1,2,3,4</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1,2,3,4</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>

Land Use - Land Cover Selection and Patch Type Rationale

Cope's gray treefrogs utilize vernal pools for breeding during the late spring and summer. Year round this species will also make use of upland habitats for resting, feeding, and overwintering. During the breeding season, this species will occasionally make daily movements into vernal pools at night and then retreat to adjacent wetland or upland forested habitats during the day (Golden 2005). As with many amphibians that breed in vernal pools, the dispersal abilities of the Cope's gray treefrog are limited; most literature on this topic suggests that this species remains within 200 m of its breeding pool during both the breeding and non-breeding season (Johnson and Semlitsch 2003, Golden 2005).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for Cope's gray treefrogs. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

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Land Use Land Cover Selections and Patch Type Justifications

Eastern Cricket Frog

BIOPID 338

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	<i>1,2,3</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1,2,3,4,5</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1,2,3</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1,2,3,4,5</i>
1800	RECREATIONAL LAND	Undissolved	<i>1,2,3</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1,2,3</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1,2,3,4,5</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1,2,3,4,5</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1,2,3,4,5</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1,2,3</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4230	PLANTATION	Undissolved	<i>1,2,3</i>

4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1,2,3</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1,2,3</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1,2,3</i>
5200	NATURAL LAKES	Undissolved	<i>1,2,3,4,5</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1,2,3,4,5</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1,2,3,4,5</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1,2,3,4,5</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1,2,3,4,5</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2,3,4,5</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2,3,4,5</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2,3,4,5</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2,3,4,5</i>

6240	HERBACEOUS WETLANDS	Undissolved	<i>1,2,3,4,5</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1,2,3,4,5</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2,3,4,5</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2,3,4,5</i>
6500	SEVERE BURNED WETLANDS	Undissolved	<i>1,2,3,4,5</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1,2,3</i>
7400	ALTERED LANDS	Undissolved	<i>1,2,3</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1,2,3,4,5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Northern cricket frogs (*Acris crepitans*) are distributed throughout much of the eastern United States and are experiencing declines throughout much of their range (Kenney and Stearns 2015, Lannoo 2005). They tend to remain in moist habitat with sufficient cover near breeding sites (Smith et al. 2003), although large movements have been observed, especially after heavy rains (Kenney and Stearns 2015, Lannoo 2005). They prefer lake habitats (Lichtenberg et al. 2006), but can be found in most fresh water bodies (Lannoo 2005), and overwinter in terrestrial burrows some distance from breeding sites (Kenney et al. 2012).

Because of their limited dispersal ability, small home range, and preference for ponds and lakes, patch type LE.1 Limited Extent is the best model to capture this species' critical habitat requirements. This patch type places the most emphasis on critical habitats closest to the original observations.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Eastern Long-tailed Salamander BIOPID 210 REGION Statewide PATCH TYPE Contiguous Area *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-3,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Riparian Dissolved	1-3,*
1711	CEMETERY ON WETLAND	Riparian Dissolved	1-3,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Riparian Dissolved	1-3,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Riparian Dissolved	1-3,*
2100	CROPLAND AND PASTURELAND	Riparian Dissolved	1-3,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-3,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-3,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Riparian Dissolved	1-3,*
2300	CONFINED FEEDING OPERATIONS	Riparian Dissolved	1-3,*
2400	OTHER AGRICULTURE	Riparian Dissolved	1-3,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	1-3,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	1-3,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	1-3,*

4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1-3,*</i>
4230	PLANTATION	Riparian Dissolved	<i>1-3,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1-3,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1-3,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1-3,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1-3,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Riparian Dissolved	<i>1-3,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Riparian Dissolved	<i>1-3,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved and Riparian Dissolved	<i>1-3,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Riparian Dissolved	<i>1-3,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Riparian Dissolved	<i>1-3,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Riparian Dissolved	<i>1-3,*</i>
6111	SALINE MARSHES (LOW MARSH)	Riparian Dissolved	<i>1-3,*</i>
6112	SALINE MARSHES (HIGH MARSH)	Riparian Dissolved	<i>1-3,*</i>
6120	FRESHWATER TIDAL MARSHES	Riparian Dissolved	<i>1-3,*</i>
6130	VEGETATED DUNE COMMUNITIES	Riparian Dissolved	<i>1-3,*</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Riparian Dissolved	<i>1-3,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-3,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Riparian Dissolved	<i>1-3,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Riparian Dissolved	<i>1-3,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Riparian Dissolved	<i>1-3,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Riparian Dissolved	<i>1-3,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Riparian Dissolved	<i>1-3,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Riparian Dissolved	<i>1-3,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-3,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Dissolved	<i>1-3,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Riparian Dissolved	<i>1-3,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Riparian Dissolved	<i>1-3,*</i>
6500	SEVERE BURNED WETLANDS	Riparian Dissolved	<i>1-3,*</i>
7100	BEACHES	Riparian Dissolved	<i>1-3,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Riparian Dissolved	<i>1-3,*</i>
7300	EXTRACTIVE MINING	Riparian Dissolved	<i>1-3,*</i>
7400	ALTERED LANDS	Riparian Dissolved	<i>1-3,*</i>

7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Riparian Dissolved	<i>1-3,*</i>
7500	TRANSITIONAL AREAS	Riparian Dissolved	<i>1-3,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Riparian Dissolved	<i>1-3,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

Longtail salamanders (*Eurycea longicauda longicauda*) primarily occur in the northern to north-central part of the state along bands of limestone bedrock and are most often associated with riparian corridors and vernal habitats (Anderson and Martino 1966, Zarate et al. 2005). Deciduous forest and wetland land use types provide habitat for this salamander (ENSP 2010). Shaded rock outcrop seepages and springs within close proximity to streams or vernal pools are the critical micro-habitat features used by longtails (Petranka 1998, Zarate expert opinion). LULC classes were selected to reflect these preferences.

Many of the occurrences for longtail salamanders are from either breeding habitats or overwintering sites. Patch type Contiguous Area values contiguous riparian habitat upon intersection with the SOA. This riparian component reflects the species' prevalence in adjacent non-urban patches and association with streams or vernal habitats and therefore is the best patch type for this salamander. Additionally, polygons of a selected set of LULC classes are also valued if they intersect the SOA. These additional, important areas capture critical habitat within and immediately surrounding the SOA not initially captured by the patch type Contiguous Area model.

Literature Citations

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- * ENSP biologist expert opinion - B. Zarate

Land Use Land Cover Selections and Patch Type Justifications

Eastern Mud Salamander

BIOPID 277

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,2
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,2
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,2
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1,2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2
6240	HERBACEOUS WETLANDS	Undissolved	1,2

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1,2</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>

Land Use – Land Cover Selection and Patch Type Rationale

Eastern Mud Salamanders (*Pseudotriton montanus montanus*) are a highly cryptic species with potential limited distribution in the state and are at the northern limit of their North American range. The paucity of in-state occurrence data leads to reliance on the literature to supplement our understanding of habitat preferences within New Jersey, in conjunction with habitat association data from our few in-state records.

Springs, swamps and bogs, seeps, slow-moving streams and their floodplains all with a moderate or heavy mud or muck component are preferential habitats for the species (Petranka 1998; NatureServe 2024). Associated and adjacent upland habitats may be used as well, often sparingly, by the adults (Petranka 1998; NatureServe 2024).

Because of their limited dispersal ability as a small salamander and likely fidelity to mud and muck habitats the Limited Extend patch type was selected. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Eastern Spadefoot

BIOPID 352

REGION Statewide

PATCH TYPE CP*.5 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>

4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>

Land Use - Land Cover Selection and Patch Type Rationale

Eastern spadefoots (*Scaphiopus holbrookii*) are found throughout the eastern United States and are experiencing declines throughout much of the northeast (Conant and Collins 1998, Timm et al. 2014). They inhabit isolated, ephemeral wetlands for breeding, and they disperse to the surrounding uplands for the remainder of the year (Greenberg and Tanner 2004, Pearson 1955, Timm et al. 2014). Spadefoots tend to spend much of their lives in burrows of about 1 in. in diameter and from 2-12 or more inches of depth (Pearson 1955). Spadefoot toads exhibit an explosive breeding response to heavy rainfall during short time periods and usually breed in ponds that have refilled after complete drying, where invertebrate predator densities are likely reduced (Conant and Collins 1998, Greenberg and Tanner 2004, Pearson 1955, Timm et al. 2014).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type CP*.5 Cardinal Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of spadefoots from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for Eastern spadefoots. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in the most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands.

Literature Citations

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3. Pearson P.G. 1955. Population ecology of the spadefoot toad, *Scaphiopus h. holbrookii* (Harlan). *Ecological Monographs*. 25(3):233-67.
4. Timm B.C., McGarigal K., and Cook R. P. 2014. Upland movement patterns and habitat selection of adult Eastern Spadefoots (*Scaphiopus holbrookii*) at Cape Cod National Seashore. *Journal of Herpetology*. 48(1):84-97.

Land Use Land Cover Selections and Patch Type Justifications

Eastern Tiger Salamander

BIOPID 220

REGION Statewide

PATCH TYPE CA.2 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2,3,4,5</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2,3,4,5</i>
1499	STORMWATER BASIN	Undissolved	<i>1,2,3,4,5</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1,2,3,4,5</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1,2,3,4,5</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1,2,3,4,5</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1,2,3,4,5</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1,2,3,4,5</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5</i>

4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2,3,4,5</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	<i>1,2,3,4,5</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4,5</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4,5</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4,5</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>1,2,3,4,5</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,2,3,4,5</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,2,3,4,5</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4,5</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4,5</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3,4,5</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3,4,5</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3,4,5</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3,4,5</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3,4,5</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1,2,3,4,5</i>
7400	ALTERED LANDS	Dissolved	<i>1,2,3,4,5</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1,2,3,4,5</i>

7600

UNDIFFERENTIATED BARREN LANDS

Dissolved

1,2,3,4,5

Land Use - Land Cover Selection and Patch Type Rationale

Ambystomid salamanders are all obligate vernal pool breeders in New Jersey. Much of each species' distribution is within 300-meters of a breeding habitat, although individuals will disperse outside of this range. Vernal pools, a type of ephemeral wetland, are identified in the LU/LC GIS coverage as various wetland and forest classes and are a critical component to the persistence of the eastern tiger salamander (*Ambystoma tigrinum tigrinum*). Many types of non-urban LU/LC classes, primarily deciduous forest and deciduous wooded wetlands, surrounding a vernal pool will serve as the non-breeding habitat for this species (Smith 2003).

Tiger salamanders do show fidelity to vernal pools as breeding habitats (Semlitsch 1998), but work by Madison and Farrand (1998) suggests that when leaving the breeding ponds ambystomid salamanders moved in all directions within forested habitats. Therefore, Patch Type B was used to capture this species' critical habitat requirements and to account for the dispersal of salamanders into adjacent suitable habitats and breeding ponds.

To better identify important breeding locations, along with the associated non-breeding habitat, that may not have been captured by the Patch Type-A methodology alone, a separate GIS layer of potential vernal habitats was included in the mapping for the eastern tiger salamander. This additional layer was selected as habitat for this species using the same Patch Type-A modeling approach and was therefore only valued if it intersected with a species observation (represented by the SOA).

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Land Use Land Cover Selections and Patch Type Justifications

Jefferson Salamander

BIOPID 208

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	2-5
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	2-5
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	2
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved and Adjacent Undissolved	2
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved and Adjacent Undissolved	2
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	2
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2-5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	2-5
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2-5
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	2-5
4230	PLANTATION	Undissolved	2-5
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	2-5

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	2-5
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	2-5
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	2-5
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	2-5
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	2-5
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	2-5
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2-5
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2-5
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	2-5
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	2-5
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	2-5
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	2-5
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2-5
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2-5
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	2-5

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	2-5
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2-5
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	2-5
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	2-5

Land Use - Land Cover Selection and Patch Type Rationale

Jefferson salamanders (*Ambystoma jeffersonianum*) are primarily vernal pool breeders (Douglas and Monroe 1981). Much of each species' distribution is within 300-meters of a breeding habitat (Douglas and Monroe 1981). Vernal pools, a type of ephemeral wetland, are identified in the LULC as various wetland and forest classes and are a critical component to the persistence of the species. Many types of non-urban land use classes, primarily deciduous forest and deciduous wooded wetlands, surrounding a vernal pool will serve as important upland, non-breeding habitat (Faccio 2003, Regosin et al. 2005).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for Jefferson salamander. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

1. Douglas, M.E. and B.L. Monroe. 1981. A comparative study of topographical orientation in *Ambystoma* (Amphibia: Caudata). *Copeia* 1981(2): 460-463.
2. Faccio, S. D. 2003. Postbreeding emigration and habitat use by Jefferson and spotted salamanders in Vermont. *Journal of Herpetology* 37:479-489.
3. Madison, D. M. 1997. The emigration of radio-implanted spotted salamanders, *Ambystoma maculatum*. *Journal of Herpetology* 31:542-551.
4. Petranka, J.W. 1998. *Salamanders of the United States and Canada*. Smithsonian Institution Press, Washington D.C., USA.
5. Regosin, J.V., B.S. Windmiller, R.N. Homan, and J.M. Reed. 2005. Variation in Terrestrial Habitat Use By Four Pool-Breeding Amphibian Species. *Journal of Wildlife Management* 69 (4): 1481-1493.

Land Use Land Cover Selections and Patch Type Justifications

Marbled Salamander

BIOPID 209

REGION Statewide

PATCH TYPE Cardinal-Proximate *

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	1,3-5
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,3-5
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	1,3-5
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved and Adjacent Undissolved	1,3-5
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved and Adjacent Undissolved	1,3-5
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	1,3-5
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	1,3-5
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,3-5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,3-5
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,3-5
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,3-5
4230	PLANTATION	Undissolved	1,3-5
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,3-5

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,3-5
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,3-5
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,3-5
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1,3-5
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1,3-5
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1,3-5
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,3-5
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,3-5
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1,3-5
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	1,3-5
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	1,3-5
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	1,3-5
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	1,3-5
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	1,3-5
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	1,3-5
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	1,3-5
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	1,3-5

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	<i>1,3-5</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,3-5</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,3-5</i>
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,3-5</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,3-5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Marbled salamanders (*Ambystoma opacum*) deposit their eggs in dry vernal pools (Petranka 1998). Much of each species' distribution is within 300-meters of a breeding habitat, although individuals will disperse outside of this range (Gamble et al. 2006). Vernal pools, a type of ephemeral wetland, are identified in the LULC as various wetland and forest classes and are a critical component to the persistence of this salamander. Many types of non-urban land use classes, primarily deciduous forest and deciduous wooded wetlands, surrounding a vernal pool will serve as important upland habitat (Faccio 2003, Regosin et al. 2005).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for marbled salamander. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

1. Faccio, S. D. 2003. Postbreeding emigration and habitat use by Jefferson and spotted salamanders in Vermont. *Journal of Herpetology* 37:479-489.
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3. Madison, D. M. 1997. The emigration of radio-implanted spotted salamanders, *Ambystoma maculatum*. *Journal of Herpetology* 31:542-551.
4. Petranka, J.W. 1998. *Salamanders of the United States and Canada*. Smithsonian Institution Press, Washington D.C., USA.
5. Regosin, J.V., B.S. Windmiller, R.N. Homan, and J.M. Reed. 2005. Variation in Terrestrial Habitat Use By Four Pool-Breeding Amphibian Species. *Journal of Wildlife Management* 69 (4): 1481-1493.

Land Use Land Cover Selections and Patch Type Justifications

New Jersey Chorus Frog

BIOPID 321

REGION Statewide

PATCH TYPE CP.3 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4230	PLANTATION	Undissolved and Adjacent Undissolved	<i>1,2,3</i>

4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1,2,3</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
5200	NATURAL LAKES	Undissolved	<i>1,2,3</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1,2,3</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1,2,3</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

The New Jersey chorus frog (*Pseudacris kalmi*), recently distinguished as an independent species from the *P. triseriata* chorus frog complex, is limited in range from New Jersey to the Delmarva Peninsula (Powell et al. 2016). Within its range, it can be found in wet habitats ranging from floodplains, to wooded wetlands, to ditches. Although they have been observed to make large dispersal movements, New Jersey chorus frogs are typically found within a few hundred meters of breeding sites (NatureServe 2019, Sias 2006).

Because of their limited dispersal ability patch type CP.1 Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of cricket frogs from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for cricket frogs. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

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2. NatureServe. 2019. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://explorer.natureserve.org>. (Accessed: September 3, 2019).
3. Sias, J. 2006. Natural History and Distribution of the Upland Chorus Frog, *Pseudacris feriarum* Baird, in West Virginia. Theses, Dissertations and Capstones. Paper 374.

Land Use Land Cover Selections and Patch Type Justifications

Northern Spring Salamander

BIOPID 279

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,2,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,2,*
1711	CEMETERY ON WETLAND	Undissolved	1,2,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1,2,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1,2,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1,2,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1,2,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,*
4230	PLANTATION	Undissolved	1,2,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,2,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,2,*

4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1,2,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1,2,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1,2,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1,2,*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2,*
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,2,*
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1,2,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,2,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2,*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2,*
6240	HERBACEOUS WETLANDS	Undissolved	1,2,*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	1,2,*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2,*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2,*
6500	SEVERE BURNED WETLANDS	Undissolved	1,2,*

7430

DISTURBED WETLANDS (MODIFIED)

Undissolved

1,2,*

Land Use - Land Cover Selection and Patch Type Rationale

Northern spring salamanders (*Gyrinophilus porphyriticus*) occur only in the northern part of the state. Typically within deciduous forest and wetland types, this salamander will live in and adjacent to springs, headwater seeps, wet rock outcrops, and small headwater tributaries (Bruce 1972, Petranka 1998, Zarate expert opinion).

Because of their limited dispersal ability, small home range, and preference for wooded headwater streams and seeps, patch type Limited Extent is the best model to capture this species' critical habitat requirements. This patch type places the most emphasis on critical habitats closest to the original observations.

Literature Citations

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- * ENSP biologist expert opinion - B. Zarate

Land Use Land Cover Selections and Patch Type Justifications

Pine Barrens Treefrog

BIOPID 231

REGION Statewide

PATCH TYPE CP*.5 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1,2,3,4</i>
1800	RECREATIONAL LAND	Undissolved	<i>1,2,3,4</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>

4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1,2,3,4</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
5200	NATURAL LAKES	Undissolved	<i>1,2,3,4</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1,2,3,4</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>

6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1,2,3,4</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1,2,3,4</i>

Land Use - Land Cover Selection and Patch Type Rationale

Pine Barrens treefrogs utilize vernal pools for breeding during the late spring and summer. Year round this species will also make use of upland forested and scrub-shrub habitats and radio-isotope tracking on this species suggests most individuals remain within 70-m of there breeding pool during the breeding season (Freda 1986), but movements away from breeding ponds of greater distances are likely outside of the breeding season (Semlitsch and Brodie 2003).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for Pine Barrens treefrogs. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Spotted Salamander

BIOPID 355

REGION Statewide

PATCH TYPE CP*.5 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	2,3,4,5
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	2,3,4,5
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	2,3,4,5
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved and Adjacent Undissolved	2,3,4,5
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved and Adjacent Undissolved	2,3,4,5
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	2,3,4,5
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	2,3,4,5
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2,3,4,5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	2,3,4,5
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2,3,4,5
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	2,3,4,5
4230	PLANTATION	Undissolved	2,3,4,5

4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	2,3,4,5
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	2,3,4,5
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	2,3,4,5
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	2,3,4,5
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	2,3,4,5
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	2,3,4,5
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	2,3,4,5
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2,3,4,5
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2,3,4,5
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	2,3,4,5
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	2,3,4,5
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	2,3,4,5
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	2,3,4,5
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2,3,4,5
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2,3,4,5
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	2,3,4,5
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2,3,4,5

6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	<i>2,3,4,5</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	<i>2,3,4,5</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>2,3,4,5</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>2,3,4,5</i>
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	<i>2,3,4,5</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>2,3,4,5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Spotted salamanders (*Ambystoma maculatum*) are primarily vernal pool breeders (Douglas and Monroe 1981). Much of each species' distribution is within 300-meters of a breeding habitat (Douglas and Monroe 1981). Vernal pools, a type of ephemeral wetland, are identified in the LULC as various wetland and forest classes and are a critical component to the persistence of the species. Many types of non-urban land use classes, primarily deciduous forest and deciduous wooded wetlands, surrounding a vernal pool will serve as important upland, non-breeding habitat (Faccio 2003, Regosin et al. 2005).

Because of their limited dispersal ability and fidelity to vernal pools and other fish-free wetlands as breeding habitats, patch type Cardinal-Proximate is the best model to capture the species' critical habitat requirements. This patch type limits the amount of habitat valued beyond the normal dispersal distances of the salamanders from their breeding habitats. To better identify important breeding locations near to the species observation (along with the associated upland, non-breeding habitat that may not have been captured by the patch type Cardinal-Proximate method alone), a separate GIS layer of potential vernal and vernal habitat areas was used in the mapping for spotted salamander. This vernal GIS layer was used to value the selected LULC classes, following the same patch type approach, given they intersected the SOA. This process results in most important breeding and upland habitats associated with the SOA to be selected.

In a final step, after polygons from the initial set of LULC classes are valued based on intersection with the SOA or an associated potential vernal or vernal habitat area, polygons from a second set of wetland LULC classes are valued, provided they are immediately adjacent to the valued area made up of the initial set of LULC classes. This was done to best represent the important habitat needs for this species near the breeding sites and in the surrounding uplands or wetlands.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

American Bittern

BIOPID 160

REGION Statewide

PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*
2100	CROPLAND AND PASTURELAND	Riparian Dissolved	*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	*
4410	OLD FIELD (< 25% BRUSH COVERED)	Riparian Dissolved	*
4411	PHRAGMITES DOMINATE OLD FIELD	Riparian Dissolved	*
4420	DECIDUOUS BRUSH/SHRUBLAND	Riparian Dissolved	*
4430	CONIFEROUS BRUSH/SHRUBLAND	Riparian Dissolved	*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Riparian Dissolved	*
5100	STREAMS AND CANALS	Dissolved	3,5
5200	NATURAL LAKES	Dissolved	2,3,5
5300	ARTIFICIAL LAKES	Dissolved	2,3,5
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	3,5
5412	TIDAL MUD FLAT	Dissolved	1,2,4
6111	SALINE MARSHES (LOW MARSH)	Dissolved	3-5

6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>3-5</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	<i>1,3-7</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,3-7</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,3-7</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,3-7</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1,3-7</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,3-7</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1,2,4</i>

Land Use - Land Cover Selection and Patch Type Rationale

American bitterns utilize freshwater marsh habitat in New Jersey, occasionally venturing into more brackish and salt water systems. They nest in tall, emergent vegetation and prefer to forage at the interface of this vegetation and the shorelines of lakes, rivers, bays and other water systems (Bent 1926, Desgranges and Houde 1989, Duebbert and Lokemoen 1977, Gibbs et al. 1991, Gibbs and Melvin 1992, Middleton 1949, Mousley 1939). They can be found in agriculture and forested areas, but only when they are associated with or adjacent to water (Davis expert opinion). Although secretive and not often observed in the open, they do use the edges of mudflats adjacent to marsh for foraging and this habitat type also connects the vegetated marsh patches they use and acts as something of a corridor (Davis expert opinion).

Patch type Contiguous Area is selected because it dissolves the LULC cover types the species is known to use into one patch and values the resulting habitat patch intersected by the SOA. The habitat used within the home range primarily consists of wetlands dominated by tall, emergent herbaceous vegetation so it is difficult to delineate (i.e. observers do not often see the extent to which they use an area). Moreover, many records consist of vocal observations. The Contiguous Area patch type, therefore, is appropriate as it ensures that all the suitable habitat in and around the likely home range will be valued. Some of the LULC types (generally the upland classes) are used by this species only when associated with water, which made the dissolve type of "Riparian Dependent" appropriate.

Literature Citations

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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

American Kestrel

BIOPID 274

REGION Statewide

PATCH TYPE CA.2 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2,3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2,3</i>
1800	RECREATIONAL LAND	Dissolved	<i>1,2,3</i>
1804	ATHLETIC FIELDS (SCHOOLS)	Undissolved	<i>1,2,3</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1,2,3</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1,2,3</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1,2,3</i>
2300	CONFINED FEEDING OPERATIONS	Dissolved	<i>1,2,3</i>
2400	OTHER AGRICULTURE	Dissolved	<i>1,2,3</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2,3</i>
6130	VEGETATED DUNE COMMUNITIES	Dissolved	<i>1,2,3</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

From Smallwood et al 2002: American kestrel prefers large (>25ha) open habitats with short ground vegetation. These habitats include grasslands, meadows, agricultural areas and open parkland.

Patch type Contiguous Area is selected to represent habitat to be valued by American kestrel species occurrence areas because this patch type dissolves adjacent polygons of the selected land use land cover types and creates patches of contiguous habitat. Large patches of habitat are preferred by breeding kestrels and are more likely to be occupied than smaller. (Smallwood 2009)

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

American Oystercatcher

BIOPID 161

REGION Statewide

PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Dissolved	5
6111	SALINE MARSHES (LOW MARSH)	Dissolved	2-5,7,9,10
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2-5,7,9,10
6130	VEGETATED DUNE COMMUNITIES	Dissolved	2-5,7,9,10
6240	HERBACEOUS WETLANDS	Dissolved	2-5,7,9,10
7100	BEACHES	Dissolved	1,3-11
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	2-5,7,9,10
7440	DISTURBED TIDAL WETLANDS	Dissolved	5

Land Use - Land Cover Selection and Patch Type Rationale

American oystercatchers utilize both salt marsh and beach habitats in New Jersey. They nest on either wrack that has washed up along the marsh or directly on the sand and raise their young in whichever habitat the nest was located in. They feed primarily on bivalves which they hunt for in a marsh environment (Bent 1929, Frohling 1965, Humphrey 1990, Lauro & Burger 1989, Nol & Humphrey 1994, Rappole 1981, Shields & Parnell 1990, Virzi, et. al 2009, Wilke 2008, Zaradusky 1985).

Patch type Contiguous Area is selected for oystercatchers since it best captures the habitat use of this species. Oystercatchers that nest in the marsh can be particularly hard to follow and the dissolve feature of this patch type ensures that all of the habitat that the species will use in a given area is captured. The same is true for their foraging behaviors – the dissolve feature allows the extent of their foraging habitat to be captured for the individuals represented by each SOA.

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Land Use Land Cover Selections and Patch Type Justifications

Bald Eagle

BIOPID 221

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,3
2100	CROPLAND AND PASTURELAND	Undissolved	1,3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1,3
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1,3
2400	OTHER AGRICULTURE	Undissolved	1,3
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,3
4230	PLANTATION	Undissolved	1,3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,3
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1,3

4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1,3
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1,3
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,3
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,3
5100	STREAMS AND CANALS	Undissolved	1,3
5200	NATURAL LAKES	Undissolved	1,3
5300	ARTIFICIAL LAKES	Undissolved	1,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1,3
5411	OPEN TIDAL BAYS	Undissolved	1,3
5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,3
6120	FRESHWATER TIDAL MARSHES	Undissolved	1,3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1,3
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,3
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,3
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1,3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,3

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1,3
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1,3
6240	HERBACEOUS WETLANDS	Undissolved	1,3
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	1,3
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1,3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1,3
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	1,3
7440	DISTURBED TIDAL WETLANDS	Undissolved	1
7500	TRANSITIONAL AREAS	Undissolved	1,3

Land Use - Land Cover Selection and Patch Type Rationale

Most non-urban habitat types that fall within 1 km of a nest are designated as critical habitat for nesting bald eagles. Habitat requirements vary from predominant forest to a nest tree surrounded by open field habitat, with nests usually located within 1.6 km of open water. Nest trees are usually super-canopy in height, but lone trees may also offer the clear view and aerial approach sought by eagles for nesting; both forested and open habitats are occupied in NJ (Paturzo and Clark 2003). Home range size for nesting bald eagles is variable depending on the habitat resources of the area such as food abundance, distance to adequate foraging habitat, etc. (Stalmaster 1987, Therres, et al. 1993, Buehler 2000, Harmata and Montopoli 2001). Successful and continued occupancy of a nest site by eagles is also influenced by distance to human disturbance often associated with residential housing, roads, extractive industries (mining, timber) and others. The 1 km radius for nest site habitat protection equals approximately 3 km² of area. This is one-third larger than what may be the mean territory size (summarized in Buehler 2000), though data specific to NJ are lacking.

A summary of territory sizes from *Birds of North America* (Buehler 2000) presents the following: Estimates of territory size (defended part of home range) vary widely based on nesting density, food supply, and method of measurement. Most reliable estimates based on radio-telemetry are limited. Stalmaster (1987) suggested 1–2 km² as typical territory size. Average territory radius ($n = 10$) was 590 m in Minnesota, as measured by presentation of decoy bird to elicit defensive reactions (Mahaffy and Frenzel 1987). Assuming circular territories, average territory size was about 1 km². Minimum territory size was 4 km² for radio-tagged pair in Saskatchewan (Gerrard et al. 1992b). Spacing between nests was observed about 1 nest/1.6 km of shoreline reported historically on Chesapeake Bay (Kirkwood 1895).

The patch type Limited Extent is selected to maximize the identification of habitats (generally, most non-urban habitats) within the critical 1 km of an active nest, the nesting territory. However, habitat patches that extend beyond the 1 km radius by virtue of being contiguous patches may be important habitat elements to the eagles' choice of that nesting site. Regional differences may exist between eagle nest sites among areas with larger versus smaller habitat patch sizes, because eagles are selecting based on food availability as well as local habitat structure and extent. This model does not represent all of eagle home range associated with a particular nesting pair; it is supplemented in that regard by the bald eagle foraging model.

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Land Use Land Cover Selections and Patch Type Justifications

Bald Eagle

BIOPID 236

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1,3
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Riparian Undissolved	1,3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Riparian Undissolved	1,3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Riparian Undissolved	1,3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Riparian Undissolved	1,3
4230	PLANTATION	Riparian Undissolved	1,3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Riparian Undissolved	1,3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Riparian Undissolved	1,3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Riparian Undissolved	1,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Riparian Undissolved	1,3
5100	STREAMS AND CANALS	Undissolved	1,3
5200	NATURAL LAKES	Undissolved	1,3
5300	ARTIFICIAL LAKES	Undissolved	1,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1,3
5411	OPEN TIDAL BAYS	Undissolved	1,3

5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,3
6120	FRESHWATER TIDAL MARSHES	Undissolved	1,3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1,3
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	1,3
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	1,3
6221	ATLANTIC WHITE CEDAR SWAMP	Riparian Undissolved	1,3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,3
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1,3
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1,3
6240	HERBACEOUS WETLANDS	Undissolved	1,3
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	1,3
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	1,3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	1,3
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	1,3
7440	DISTURBED TIDAL WETLANDS	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Bald eagle foraging habitat is defined as the amount of foraging habitat required to support a nesting pair of eagles throughout the year, as breeding bald eagles are year-round residents in NJ. Bald eagles hunt in open water for fish, waterfowl, turtles, eels and other aquatic species, but usually do so from perches along the water's edge (Stalmaster 1987, Buehler 2000).

Based on the clear association of bald eagles with rivers, streams and other water bodies, patch type Limited Extent is applied to value forest land use types coded as riparian (maximum distance of 100 meters from a water body) and intersecting the bald eagle foraging species occurrence area model (ENSP 2011) associated with an active nest. This habitat model is different from, and in addition to, the bald eagle nest habitat valuation.

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Land Use Land Cover Selections and Patch Type Justifications

Bald Eagle

BIOPID 238

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1</i>
4230	PLANTATION	Undissolved	<i>1</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>

7440

DISTURBED TIDAL WETLANDS

Undissolved

1

Land Use - Land Cover Selection and Patch Type Rationale

Bald eagle roosting habitats were identified using recorded sightings of more than two eagles located in single sites at times approaching dusk and shortly after dawn. These sightings generally included more than ten individual eagles using a site for overnight roosting and were not associated with a nest. Polygons of suitable habitat (forest, forested wetlands, fields and open waters) that intersected with each winter occurrence were designated as habitat.

From the Birds of North America (Buehler 2000): For bald eagles, winter habitat suitability is defined by food availability, presence of roost sites that provide protection from inclement weather, and absence of human disturbance. Roost sites are mature forest habitat usually located within a few miles of foraging areas, and are characterized by large trees (often conifers) that provide some protection from wind, rain and snow, and are free of human disturbance.

Patch type Limited Extent is used to value suitable habitats that intersect with bald eagle occurrence records characterized and delineated as roosts. This patch type limited the extent of suitable habitat valued to those intersected by a recorded occurrence; larger areas may be identified as additional records of wintering eagles are documented in a particular area.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Barn Owl

BIOPID 225

REGION Statewide

PATCH TYPE Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
2100	CROPLAND AND PASTURELAND	Dissolved	1,2
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1,2
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1,2
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	2
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent Undissolved	2
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	2
6111	SALINE MARSHES (LOW MARSH)	Dissolved	2
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	2
6240	HERBACEOUS WETLANDS	Dissolved	2
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Adjacent Undissolved	2
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	2

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands which are characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agriculture, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (i.e. field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC shapefiles are not frequent enough to capture the changes to a given site.

Barn owls are considered open field raptors using grasslands, pastures, marshes and other agricultural areas (Marti et al. 2005). In New Jersey, barn owls primarily occur along the coast. Phragmites adds to the overall mosaic of the grassland for both wintering and breeding birds (Marti et al. 2005).

Patch Type Cardinal-Proximate is selected for barn owls since they are mobile species, reflecting the dynamic nature of their preferred habitats and the need to follow prey supplies (Marti et al. 2005). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable habitat for breeding and non-breeding barn owls. Proximate LULC polygons are only valued if they are adjacent to cardinal habitat because while important to the local population, that LULC class would not be used by the species if not associated with the cardinal classes. This approach limits the habitat valued to that which the population uses but accommodates its need for breeding, wintering and foraging habitat.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Barred Owl

BIOPID 38

REGION Statewide

PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	3-6
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	3-6
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3-6
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	3-6
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3-6
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	3-6
4230	PLANTATION	Dissolved	3-6
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	3-6
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	3-6
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	3-6
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	3-6
6210	DECIDUOUS WOODED WETLANDS	Dissolved	3-6
6220	CONIFEROUS WOODED WETLANDS	Dissolved	3-6
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	3-6
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	3,*

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	3,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	3,*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	3,*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	3,*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	3-6

Land Use - Land Cover Selection and Patch Type Rationale

Mazur and James (2000) stated that barred owls are restricted to forested areas, ranging from swamps and riparian areas to upland regions. While large, unfragmented blocks of forests are usually preferred, recent literature describes barred owls using mature forest patches within suburban areas as well (Harrold 2003). Throughout its range, it is found in association with mature and old-growth forests, typically of mixed deciduous-coniferous composition. In New Jersey, found in old-growth hardwood, cedar swamps, and upland oak-pine forests (Laidig and Dobkin 1995, Liguori 2003). In New Hampshire and Connecticut, mixed hardwood-conifers; avoids marshes and agricultural lands. Old-growth hemlock, maple, and hemlock-maple forests used in Michigan (Elody and Sloan 1985). In Minnesota, mixed hardwood-conifer and oak woods selected (Fuller 1979). As presented in Mazur and James (2000), barred owls in Ontario were strongly associated with tall, unfragmented, mixed wood forests; avoids young forests. Thought to prefer old forests owing to greater availability of potential nest trees, lower stem densities that facilitate easier hunting, and closed canopy for thermoregulation and protection from mobbing. The structural complexity of old forests thought to provide diversity of prey (Mazur and James 2000). At nest sites, mature and old forest is typical nest habitat, including a wide range of forest types, both conifer and hardwood; nest sites may be found in areas with well-developed understory (Mazur and James 2000). Some studies indicate association with water, yet others found no such evidence. Adults forage near nest site during breeding period, suggesting that prey availability may be important in nest-site selection as well (Mazur and James 2000).

Barred owl home ranges are highly variable geographically and are generally larger during the non-breeding season (Mazur and James 2000). Home range results identified within the literature illustrate this variability (Nichols and Warner 1972, Fuller 1979, and Elody and Sloan 1985). As year-round residents to NJ, barred owl habitat represents breeding and non-breeding use.

Barred owl habitat was identified using the LULC classes listed above and applying patch type Contiguous Area to identify entire patches of suitable habitat before segregation by roads or unsuitable habitat types. This approach is appropriate for barred owls because they tend to reside within larger forest patches, which this patch type is designed to create.

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- * ENSP biologist expert opinion – M. Valent and K. Clark

Land Use Land Cover Selections and Patch Type Justifications

Black Rail

BIOPID 162

REGION Statewide

PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Dissolved	*
5200	NATURAL LAKES	Dissolved	*
5300	ARTIFICIAL LAKES	Dissolved	*
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	*
5411	OPEN TIDAL BAYS	Undissolved	*
5412	TIDAL MUD FLAT	Dissolved	<i>1</i>
6111	SALINE MARSHES (LOW MARSH)	Dissolved	<i>2,4,6</i>
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	<i>2-4,6</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1,2</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	*
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-5</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	*
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Black rails are found in both freshwater and saltwater tidal marshes where they breed and forage. They can occur in both the Atlantic coast and Delaware Bay marshes (Eddleman et al. 1994, Eddleman 1988, Flores and Eddleman 1995, Kerlinger and Sutton 1989, Todd 1977, Weske 1969). Although they do not utilize open water for foraging, preferring to feed within and along the edges of the marsh, this habitat does connect the marsh patches they use and acts as something of a corridor as they fly from one area to another. To fully capture the habitat they are likely using, it was important to value open water.

Patch type Contiguous Area is selected because it dissolves the LULC types the species is known to use into one patch and values the resulting habitat patch intersected by the SOA. The habitat used within the home range primarily consists of wetlands dominated by dense herbaceous vegetation so it is difficult to delineate (i.e. observers do not often see the extent to which they use an area). Moreover, many records consist of vocal observations. The Contiguous Area patch type, therefore, is appropriate as it ensures that all the suitable habitat in and around the likely home range will be valued.

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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Black Skimmer

BIOPID 163

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	5
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,3-5
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-5
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1-6
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1-5
6240	HERBACEOUS WETLANDS	Undissolved	1,3,4
7100	BEACHES	Undissolved	1-6
7440	DISTURBED TIDAL WETLANDS	Undissolved	5

Land Use - Land Cover Selection and Patch Type Rationale

Black skimmers nest in both the salt marsh and on the beach. When they nest in the marsh their nests are located on either wrack mats or sandy patches of marsh islands. On the beach, they use sparsely vegetated beaches, often near inlets, laying their eggs right on the sand (Burger and Gochfeld 1990, Clapp, et. al 1983, Erwin 1979, Erwin 1980, Gochfeld and Burger 1994, Gore 1991). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Gochfeld and Burger 1994, C. Davis expert opinion).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. This is possible because black skimmers are well surveyed in the state and nest in easily delineated, discrete colonies. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option since it won't value habitats not being used by this species.

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Black Skimmer

BIOPID 164

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5200	NATURAL LAKES	Undissolved	2,3
5300	ARTIFICIAL LAKES	Undissolved	2,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1-3
5411	OPEN TIDAL BAYS	Undissolved	1-3
5412	TIDAL MUD FLAT	Undissolved	2
5420	DREDGED LAGOON	Undissolved	2,3
5430	ATLANTIC OCEAN	Undissolved	2
6111	SALINE MARSHES (LOW MARSH)	Riparian Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Riparian Undissolved	1,2
6130	VEGETATED DUNE COMMUNITIES	Riparian Undissolved	*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Riparian Undissolved	2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	2
6240	HERBACEOUS WETLANDS	Riparian Undissolved	*
7100	BEACHES	Undissolved	*
7440	DISTURBED TIDAL WETLANDS	Undissolved	2

Land Use - Land Cover Selection and Patch Type Rationale

Black skimmers will use many types of water bodies to forage for fish – the ocean, bays, inlets, ponds, lakes or rivers (Erwin 1977, Gochfeld and Burger 1994, Valiela 1984). The land-based habitat (including mudflats) that is valued is important for foraging birds to use as a resting location between foraging forays and also as a connector between important water patches (Gochfeld and Burger 1994). It is also where the adults will feed the young.

Patch type Limited Extent is selected because black skimmers are a highly surveyed species in the state and their distribution is well understood. The nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. The Limited Extent patch type values the habitat that is most likely used by the associated colony (which is based on an understanding of foraging commutes) without extending it to areas that are less likely to be used. The LULC polygons that are land-based were coded “Riparian Undissolved” because they are areas that are only important to black skimmers for foraging when they are located adjacent to water.

Literature Citations

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 2. Gochfeld, M. and J. Burger. 1994. Black Skimmer (*Rynchops niger*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 17 March 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/108doi:10.2173/bna.108>
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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Black-billed Cuckoo

BIOPID 47

REGION Statewide

PATCH TYPE CP*.1 Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved and Adjacent Undissolved	1
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved and Adjacent Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved and Adjacent Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved and Adjacent Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	1
1800	RECREATIONAL LAND	Undissolved and Adjacent Undissolved	1
2100	CROPLAND AND PASTURELAND	Undissolved and Adjacent Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	1
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Adjacent Undissolved	1

2400	OTHER AGRICULTURE	Undissolved and Adjacent Undissolved	<i>1</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4230	PLANTATION	Undissolved and Adjacent Undissolved	<i>1</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved and Adjacent Undissolved	<i>1</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1</i>

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1</i>
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	<i>1</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Breeding habitat for Black-billed cuckoos consists of open-canopy deciduous and mixed forests containing high densities of shrubs and saplings, usually associated with water; including young forests, abandoned farmland converting to aspen/birch forests, forest edges, marsh/bog edges, shrubby wetlands, shrubby pastures, orchards and berry patches, and hawthorn thickets (Hughes 2020). While Black-billed Cuckoos are occasionally also found breeding in parks, golf courses, and residential gardens, they may be area sensitive and require larger tracts of forest, and susceptible to habitat fragmentation and modification (Hughes 2020). This suggests that breeding Black-billed Cuckoos depend on forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Patch type Cardinal-Proximate is applied because patch type Limited Extent fails to value patches of suitable habitat adjacent to preferred habitat (< 100m away) that would likely be used by the local population represented but the documented species occurrence. Patch type Cardinal-Proximate also allows the LULCs representing preferred habitat, such as open-canopy forests and shrublands, to be dissolved without also dissolving all possible habitat types and allows for edge habitats to be included without over-valuing the habitat types that create that edge. This will both reflect the possible area sensitivity in habitat selection of Black-Billed Cuckoos while not over-valuing the habitats that would not contribute to core habitat, such as agricultural fields and urban areas.

Literature Citations

1. Hughes, J. M. (2020). Black-billed Cuckoo (*Coccyzus erythrophthalmus*), version 1.0. In Birds of the World (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.bkbcuc.01>

Land Use Land Cover Selections and Patch Type Justifications

Blackburnian Warbler

BIOPID 48

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	2
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	2
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	2
1800	RECREATIONAL LAND	Dissolved	2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,3
4230	PLANTATION	Dissolved	1,3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	2
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1,3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	2
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1,3
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	2
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	2

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	2
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1,3
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1,3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	2
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	2
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	1,3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	1,3

Land Use - Land Cover Selection and Patch Type Rationale

Blackburnian Warblers breed in coniferous and mixed coniferous-deciduous mature forests, but also inhabit deciduous forest at the southern end of the range, which includes NJ and the southern Appalachian Mountains; in NY, this species is found breeding mostly in hemlock forests but also in mature deciduous forests with few hemlocks (Morse 2020). This species is area sensitive and negatively impacted by urban intensity with a 1-km scale of effect (Paton et al. 2019).

Densities of nesting Blackburnian Warblers have a quadratic relationship with tree canopy cover in that highest densities increased with increasing tree canopy cover to a point, then levelled off or declined as tree canopy cover continued to increase. This species will breed in forests with <50% tree canopy cover and 100% tree canopy cover, but densities peak at 80% tree canopy cover (Akresh et al. 2023). During the post-fledging/pre-migration period, however, Blackburnian Warblers were more commonly found in large forest canopy gaps and regenerating clear cuts than in closed-canopy mature forests (Chandler et al. 2012). This suggests that breeding Blackburnian Warblers depend on mature forests and require forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Although Blackburnian Warblers do not use urban areas while breeding, LULC 1700 (Other urban or built up land) was included as habitat because some habitat types, including grasslands and regenerating forest stands, have been misclassified as this LULC.

Blackburnian Warblers breed in forest interiors and are sensitive to forest fragmentation (Morse 2020). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

Literature Citations

1. Morse, D. H. (2020). Blackburnian Warbler (*Setophaga fusca*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.bkbwar.01>
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Land Use Land Cover Selections and Patch Type Justifications

Black-crowned Night-heron

BIOPID 166

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,2
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,2
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,2
5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,2
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1,2
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1,2</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1,2</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Black-crowned night-herons use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in shrubs (such as marshelder, *Iva frutescens*) and trees (such as black cherry, *Prunus serotina*) in the Atlantic coastal marsh islands. They have also been documented using Phragmites (*Phragmites australis*) for nesting (Davis 1993, Palmer 1962). In some cases, the night-herons will nest in areas that are further inland than the marsh islands, though they generally stay near open water when possible. These nests are typically located in trees (Davis 1993, Palmer 1962, Davis expert opinion). Although they will not nest in open mudflat areas and primarily use them for foraging, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The birds can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Davis 1993).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. This is possible because black-crowned night-herons are well surveyed in the state and nest in easily delineated, discrete colonies. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option since it won't value habitats not being used by this species.

Literature Citations

1. Davis, Jr., William E. 1993. Black-crowned Night-Heron (*Nycticorax nycticorax*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 17 March 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/074doi:10.2173/bna.74>
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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Black-crowned Night-heron

BIOPID 167

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5100	STREAMS AND CANALS	Undissolved	<i>1,2</i>
5200	NATURAL LAKES	Undissolved	<i>1,2</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1,2</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1,2</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>*</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1,2,3</i>
5420	DREDGED LAGOON	Undissolved	<i>1,2</i>
6111	SALINE MARSHES (LOW MARSH)	Riparian Undissolved	<i>1-3</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>1-3</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1,2</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	<i>1-3</i>
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	<i>1-3</i>
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	<i>1-3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1</i>

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-3</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-3</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	<i>1-3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	<i>1-3</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Black-crowned night-herons are generalist hunters, meaning they will eat a wide variety of prey items including fish, mollusks, bivalves, insects, frogs, birds, and small mammals. They will use open water to stalk aquatic prey and will hunt in marshes, on mudflats and forest edges associated with wetlands for many of the other items they eat (Davis 1993, Gross 1923, Hoefler 1979).

Patch type Limited Extent is selected because black-crowned night-herons are a highly surveyed species in the state and their distribution is well understood. The nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Using Limited Extent patch type values the habitat that is most likely used by the associated colony (which is based on an understanding of foraging commutes) without extending it to areas that are less likely to be used.

Literature Citations

1. Davis, Jr., William E. 1993. Black-crowned Night-Heron (*Nycticorax nycticorax*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 17 March 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/074doi:10.2173/bna.74>
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 3. Hoefler, J. E. 1979. Status and distribution of Black-crowned Night Herons in Wisconsin. Proceedings of Colonial Waterbird Group 3:75-84.
- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Black-throated Blue Warbler

BIOPID 49

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2,3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2,3</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1,2,3</i>
1800	RECREATIONAL LAND	Dissolved	<i>1,2,3</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,3</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,3</i>
4230	PLANTATION	Dissolved	<i>1,3</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,3</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,3</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,3</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Black-throated Blue warblers breed mainly in large, continuous tracts of undisturbed deciduous or mixed deciduous/ coniferous forests with dense shrub layers and use dense patches of regenerating aspen and spruce or in red pine plantations with a dense, deciduous sapling understory in the post-fledging season (Holmes et. al 2020). Forests most suitable as breeding habitat contain a relatively thick undergrowth of dense, usually deciduous or broad-leaved evergreen shrubs, including clearcut forests >15 years old (Holmes et. al 2020). This species is area sensitive and highly negatively impacted by urban intensity with a 1-km scale of effect (Paton et al. 2019).

Densities of nesting Black-throated Blue Warblers have a quadratic relationship with tree canopy cover in that highest densities increased with increasing tree canopy cover to a point, then levelled off or declined as tree canopy cover continued to increase. This species will breed in forests with <50% tree canopy cover and 100% tree canopy cover, but densities peak between 55 and 80% tree canopy cover (Akresh et al. 2023). During the post-fledging/pre-migration period, however, Black-throated Blue Warblers were more commonly found in large forest canopy gaps and regenerating clear cuts than in closed-canopy mature forests (Chandler et al. 2012). This suggests that breeding Black-throated Blue Warblers depend on mature forests and require forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Although Black-throated Blue Warblers do not use urban areas while breeding, LULC 1700 (Other urban or built up land) was included as habitat because some habitat types, including grasslands and regenerating forest stands, have been misclassified as this LULC.

Patch type Contiguous Area is applied because Black-throated Blue Warblers are area-sensitive forest-interior birds (Holmes et al. 2020). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

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Land Use Land Cover Selections and Patch Type Justifications

Black-throated Green Warbler

BIOPID 35

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	2,3,4
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	2,3,4
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	2,3,4
1800	RECREATIONAL LAND	Dissolved	2,3,4
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,3,4
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,3,4
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,2
4230	PLANTATION	Dissolved	1,2
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	2,3,4
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1,3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1,3
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	2,3,4
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	2,3,4

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>2,3,4</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,3</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,3</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1,3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>2,3,4</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>2,3,4</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>2,3,4</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>2,3,4</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Breeding habitat for Black-throated Green Warblers consists of coniferous forests, including hemlock forests, mixed and deciduous forests, and in more southern areas they will inhabit Atlantic white cedar wetlands (Morse and Poole 2020). Nests are typically located in shrubs or saplings (Morse and Poole 2020), and breeding individuals have been seen in utility rights-of-way and other shrubby habitats adjacent to forests, as well as pine plantations surrounded by forest (Petzinger expert opinion). This species is area-sensitive and negatively impacted by urban intensity with a 1-km scale of effect (Paton et al. 2019).

Densities of nesting Black-throated Green Warblers have a linear relationship with tree canopy cover in that highest densities increased with increasing tree canopy. That said, this species will breed in forests with <50% tree canopy cover but densities peak between 80 and 100% tree canopy cover (Akresh et al. 2023). During the post-fledging/pre-migration period, however, Black-throated Green Warblers were more commonly found in large forest canopy gaps and regenerating clear cuts than in closed-canopy mature forests (Chandler et al. 2012). This suggests that breeding Black-throated Green Warblers depend on mature forests and require forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Although Black-throated Green Warblers do not use urban areas while breeding, LULC 1700 (Other urban or built up land) was included as habitat because some habitat types, including grasslands and regenerating forest stands, have been misclassified as this LULC.

Black-throated Green Warblers breed in interior forests, are area-sensitive, and require large tracts of forest to breed (Morse and Poole 2020). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

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Land Use Land Cover Selections and Patch Type Justifications

Blue-winged Warbler

BIOPID 339

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2,3</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2,3</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	<i>1,2</i>
1800	RECREATIONAL LAND	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
2100	CROPLAND AND PASTURELAND	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1,2</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1,2</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Adjacent Undissolved	<i>1,2</i>
2400	OTHER AGRICULTURE	Undissolved and Adjacent Undissolved	<i>1,2</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2,3</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>1,2</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3</i>

6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6500	SEVERE BURNED WETLANDS	Dissolved	<i>1,2</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Blue-winged Warblers usually nest in early- to midsuccession habitat with patches of dense, herbaceous growth as well as of shrubs and some forest cover which include forest clearings, shrublands, regenerating clearcuts, powerline rights-of-way, wetlands, and along forest edges and roadsides (Gill et al. 2020).

In New Jersey, Blue-winged Warblers are early successional habitat generalists provided the area contains 25-50% herbaceous cover and 25-50% shrub cover regardless of the amount of residential, agricultural, or forest cover in the surrounding landscape. They prefer to breed in upland shrubby fields and powerline rights-of-way as well as abandoned farms, herbaceous and forested wetlands, and regenerating open-canopy forests after seed tree silvicultural prescriptions (Petzinger expert opinion). While Blue-winged Warblers are not area sensitive, they are only reported breeding in residential areas when other habitat, such as forest-grassland edges, shrublands, or powerlines, are present (eBird).

Although Blue-winged Warblers do not use urban areas while breeding, LULC 1700 (Other urban or built up land) was included as habitat because some habitat types, including grasslands and regenerating forests, have been misclassified as this LULC.

Because Blue-winged Warblers use field/shrub-forest edge habitat but not closed-canopy upland forests, the Cardinal-Proximate patch type was chosen as the best representation to depict suitable habitat. Early-successional habitat, open forest, and shrubby areas were chosen as cardinal habitats and dissolved except for a few categories (upland rights-of-way (developed), agriculture, orchards, wooded and disturbed wetlands). Those exceptions can be suitable habitat but tend to expand over large areas; therefore, these LULCs were chosen to be undissolved and adjacent undissolved to reduce the connectivity of this habitat type. Closed-canopy forest by itself is not suitable habitat but is suitable when adjacent to primary habitat types, and occasionally regenerating forests with 30% canopy cover have been misclassified as forests with >50% canopy cover. Again, this LULC group was chosen to not be dissolved because it tends to expand over large areas.

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2. ENSP Biologist expert opinion – S. Petzinger
3. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Bobolink

BIOPID 34

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Dissolved	1,2,3,4,5,6,7,8,9
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	3
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1,2,3,4,5,6,7,8,9
1800	RECREATIONAL LAND	Dissolved	1,2,3,4,5,6,7,8,9
2100	CROPLAND AND PASTURELAND	Dissolved	1,2,3,4,5,6,7,8,9
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1,2,3,4,5,6,7,8,9
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1,2,3,4,5,6,7,8,9
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	3
2400	OTHER AGRICULTURE	Dissolved	3,4
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1,2,3,4,5,6,7,8,9
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	3,4
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	3,4
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	3,4
6120	FRESHWATER TIDAL MARSHES	Dissolved	1,2,3,4,5,6,7,8,9

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>3,4</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>3,4</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>3,4</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>3,4</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9</i>
7300	EXTRACTIVE MINING	Dissolved	<i>3,4</i>
7400	ALTERED LANDS	Dissolved	<i>1,2,3,4,5,6,7,8,</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1,2,3,4,5,6,7,8,9</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9</i>

Land Use - Land Cover Selection and Patch Type Rationale

Breeding Bobolinks are area sensitive, obligate grassland birds that evolved with large open native grasslands with different vegetation components to successfully breed, including high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance (Askins 2002, Renfrew et al. 2020). Bobolinks nest on the ground, typically at the wetter margins of fields at the base of a sturdy herbaceous plant (Renfrew et al. 2020) and prefer areas with dense grassland habitat with thick layers, low to moderate amounts of forbs, and high litter cover and grass-to-legume ratios (Dechant et al. 200, Renfrew et al. 2020). Vegetative structure of the grassland appears to be more important than the actual type of vegetation (Norment et al. 2010), though there may be a preference for warm-season grasses (Renfrew et al. 2020). Suitable breeding habitat for Bobolinks include hayfields, airports, pastures, fallow fields, and meadows with moderate to tall vegetation, as well as irrigated meadows and reclaimed mines to nest, forage and raise their young (Vickery et al. 1994; Norment et al. 2010; Shustack et al. 2010, Renfrew et al. 2020), though they avoid breeding in suitable habitat when it's within 100 meters of a forested edge (mean distance 94.5 ± 56.5 m; Dechant et al. 2001, Renfrew et al. 2020). Foraging mainly occurs in forbs, grasses, and sedges, but Bobolinks also forage in shrubs and occasionally in trees (Renfrew et al. 2020).

Most grassland habitats in New Jersey are an artifact of other land uses, such as hayfields and sod farms, airports, and landfills, and all require some type of active management (mowing or burning) to remain suitable as grassland habitat (Petzinger expert opinion). In New Jersey, Bobolinks are known to breed in agricultural fields and pastures, airports, landfills, and parks (Petzinger expert opinion, eBird.org).

Morgan and Burger (2008) developed a predictive model for potential grassland bird habitat in New York using land cover classes that captured land use that maintained early successional habitat including airports, developed open space, barren land, scrub/shrub, grassland/herbaceous, pasture/hay, cultivated crops and emergent herbaceous wetlands. The results of this model were used to justify many of the LULC choices for bobolinks. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008).

Patch type Contiguous Area is selected for Bobolinks due to area sensitivity, dynamic nature of grassland birds needing to change locations once habitats become unsuitable, and their ability to use suitable habitat adjacent to many urban LULCs and cross roads/runways, rural residential areas, and other open non-habitats that separate what would be an otherwise contiguous habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Bobolink

BIOPID 54

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1,3,4
1440	AIRPORT FACILITIES	Undissolved	4,6,7,8,9,10
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,3,4
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,3,4
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	4,8,9,10
1800	RECREATIONAL LAND	Undissolved	4,9,10
2100	CROPLAND AND PASTURELAND	Undissolved	1,2,3,4,5,6,7,8,9,10
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	3,4,5,8,9,10
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	2,3,4,10
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	4
2400	OTHER AGRICULTURE	Undissolved	3,4
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1,2,3,4,9,10
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1,3,4,10
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,3,4,10
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,3,4,10

6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>3,9,10</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>3,9,10</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>3,9,10</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,3,10</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,3,10</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,3,10</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,3,10</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1,3,10</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1,3,10</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1,3</i>
7400	ALTERED LANDS	Undissolved	<i>1,3,4</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1,3,4,10</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>3,4,8,10</i>

Land Use - Land Cover Selection and Patch Type Rationale

Bobolinks are one of the few obligate grassland bird species that are long-distance Neotropical migrants and make one of the longest annual migration of any passerine (Renfrew et al. 2020). Bobolinks use the same habitat as their breeding habitat (hayfields, airports, pastures, fallow fields, and meadows with moderate to tall vegetation, as well as irrigated meadows and reclaimed mines; Askins 2002, Dechant et al. 2001, Vickery et al. 1994, Shriver et al. 2005, Norment et al. 2010, Shustack et al. 2010, Renfrew et al. 2020) but will forage along the coast and in marshes during migration; they also congregated in large flocks in freshwater and coastal marshes prior to beginning fall migration (Renfrew et al. 2020). Migrant bobolinks also rely on shrubland habitat for food and cover (Askins 2002).

Most grassland habitats in New Jersey are an artifact of other land uses, such as hayfields and sod farms, airports, and landfills, and all require some type of active management (mowing or burning) to remain suitable as grassland habitat (Petzinger expert opinion). In New Jersey, Bobolinks are known to breed in agricultural fields and pastures, airports, landfills, and parks (Petzinger expert opinion, eBird.org) and use similar habitats as well as coastal marshes and other wetlands during migrations (eBird.org).

Morgan and Burger (2008) developed a predictive model for potential grassland bird habitat in New York using land cover classes that captured land use that maintained early successional habitat including airports, developed open space, barren land, scrub/shrub, grassland/herbaceous, pasture/hay, cultivated crops and emergent herbaceous wetlands. The results of this model were used to justify many of the LULC choices for bobolinks. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008).

Patch type Limited Extent is selected for bobolink observations during migration because bobolinks are not area sensitive during migration and will congregate in small areas for short periods of time before they move southward. The resulting polygons value the habitat important to migrating bobolinks while limiting the expansion into areas that are less likely to be used during migration.

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Land Use Land Cover Selections and Patch Type Justifications

Broad-winged Hawk

BIOPID 226

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1</i>
4230	PLANTATION	Undissolved	<i>1</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

From Goodrich et al. (1996): The broad-winged hawk nests predominantly in the humid temperate ecoregion domain. Forests at mid-latitudes consist of broad-leaf and coniferous trees. This bird nests in continuous deciduous or mixed-deciduous forests, with openings and water nearby. Forages near small openings in the canopy. In New York, nests on slopes more than on level sites. In Minnesota and Wisconsin, uses managed forests, oak-aspen stands 35–50 yr old; nest stands dominated by northern red oak with 204 trees/ha, on average. In Ontario, uses young, deciduous-dominated forests with a mean canopy height of 21 m and mean elevation of 350.4 ± 48.8 (SD) m. Conifer plantations used rarely.

Although it generally nests away from human dwellings, it is sometimes indifferent. It is detected more frequently in undisturbed, mixed conifer-deciduous forests of Maine than in areas used for agriculture or forestry. Compared to nesting red-shouldered hawks, broad-wings use younger forests with more openings.

Patch type Limited Extent is selected to value forest habitats within and adjacent to the species' occurrence location and its approximate home range area as represented by the SOA, without valuing additional, adjacent habitats.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Brown Thrasher

BIOPID 51

REGION Statewide

PATCH TYPE CP*.3 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved and Adjacent Undissolved	1
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved and Adjacent Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved and Adjacent Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved and Adjacent Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	1
1710	CEMETERY	Undissolved and Adjacent Undissolved	1
1711	CEMETERY ON WETLAND	Undissolved and Adjacent Undissolved	1
1800	RECREATIONAL LAND	Undissolved and Adjacent Undissolved	1
2100	CROPLAND AND PASTURELAND	Undissolved and Adjacent Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	1

2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	<i>1</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Adjacent Undissolved	<i>1</i>
2400	OTHER AGRICULTURE	Undissolved and Adjacent Undissolved	<i>1</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4230	PLANTATION	Undissolved and Adjacent Undissolved	<i>1</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved and Adjacent Undissolved	<i>1</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	<i>1</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	<i>1</i>

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	<i>1</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved and Adjacent Undissolved	<i>1</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	<i>1</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>1</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

From Cavitt and Haas (2000): Brown thrashers breed in dry, open country, especially in thickets and scrubby fields and brushy hillsides covered with hawthorn. In New Jersey pine barrens habitat, thrashers breed at high densities in regularly burned habitat dominated by pitch pine, scrub oak and black jack oak but are absent or rare in areas where fire suppression allows oaks to grow to canopy. Brown thrashers have not been found breeding in New Jersey woodlots <0.8 ha in size and are rare in woodlots of <4 ha. They only occasionally breed in urban settings, such as yards, gardens, and fencerows. Although this species uses a wide variety of habitats, highest densities are obtained in shrub or mid-successional stages of forests. Habitat suitability peaks when density of woody stems =1.0 m tall are 10,000-30,000/ha, percentage of canopy cover of trees is 10-30%, and percentage of ground surface covered by litter =1 cm deep is >80%.

Patch type Cardinal-Proximate is applied because brown thrashers are not interior forest birds and can breed in urban areas, so patches do not need to be dissolved to represent the area needed for breeding individuals. However, because some areas valued by just using patch type Limited Extent were too small to sustain a breeding pair, let alone a local population, patch type Cardinal-Proximate was chosen to expand the area of habitat depicted by including suitable habitat adjacent to cardinal habitat valued by the SOA, but none of the polygons are dissolved, whether cardinal or proximate, thus limiting the extent of valued habitat to the areas likely to be used by the local breeding population. Because this species can use forest/field edges, large contiguous patches of forest and agriculture will be valued by the model, however, the most suitable portions of closed-canopy forest and agriculture used by brown thrashers are likely to be found within 200 meters of the forest edge.

Literature Citations

1. Cavitt, John F. and Carola A. Haas. 2000. Brown Thrasher (*Toxostoma rufum*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/557doi:10.2173/bna.557>

Land Use Land Cover Selections and Patch Type Justifications

Canada Warbler

BIOPID 52

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2,3,4</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2,3,4</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1,2,3,4</i>
1800	RECREATIONAL LAND	Dissolved	<i>1,2,3,4</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4</i>
4230	PLANTATION	Dissolved	<i>1,2,3,4</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>2,4</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4</i>

4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,2,3,4</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,2,3,4</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1.2.4</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3,4</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3,4</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>2,4</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3,4</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3,4</i>

Land Use - Land Cover Selection and Patch Type Rationale

Canada Warblers are area sensitive, especially in regions dominated with more urban/residential areas than forested areas and prefer areas with >50% forest cover within a 2-km radius (Lambert and Faccio 2005) - they are highly negatively impacted by urban intensity with a 1-km scale of effect and breed in areas with significantly more forest cover than what is available (Paton et al. 2019). They use a wide range of deciduous and coniferous forests, are most abundant in moist, mixed coniferous-deciduous forests with a well-developed understory (Reitsma et al. 2020, USFWS 2001), and nest in lowland and upland forest habitats, including swamps, streamside thickets, brushy ravines, moist forests, and regenerating timber cuts with a well-developed shrub layer and structurally complex forest floor (Lambert and Faccio 2005, Reitsma et al. 2020). At lower elevations Canada Warblers often nest in cool, wet, low-lying areas such as cedar forests, swampy forests, sphagnum bogs, moist forest clearings and woodland edges, spruce tamarack bogs, aspen and moist spruce-birch forests, alder and willow stands along stream banks, early successional forest stands and younger, cut-over forests (Reitsma et al. 2020, Westwood et al. 2017). Canada Warbler adults and chicks inhabit regenerating clearcuts and other openings in the forest canopy after chicks leave the nest (Marshall et al. 2003) more often than closed-canopy forests (Chandler et al. 2012). This suggests that breeding Canada Warblers depend on forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Although Canada Warblers do not use urban areas while breeding, LULC 1700 (Other urban or built up land) was included as habitat because some habitat types, including grasslands and regenerating forest stands, have been misclassified as this LULC.

Patch type Contiguous Area is applied because breeding populations need large forest tracts in addition to shrubby areas to breed and are likely the most sensitive of forest-dependent birds to urbanization. Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Caspian Tern

BIOPID 168

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,2
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1
6240	HERBACEOUS WETLANDS	Undissolved	1
7100	BEACHES	Undissolved	1,2
7440	DISTURBED TIDAL WETLANDS	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Caspian terns often nest in Atlantic coastal marsh islands on mats of wrack. They can also occur on beaches. Their nests are small divots in the wrack or on the sand. They nest colonially and can nest with other tern species as well (Cuthbert & Wires 1999, Ludwig 1991). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Cuthbert & Wires 1999, Davis expert opinion).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. Although caspian terns are infrequent nesters in the state, the habitats they would occur in are surveyed regularly and colonies are easily delineated when observed. It is therefore satisfactory to capture the breeding birds' habitat without overvaluing areas of the state. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only identify habitats valued by this species.

Literature Citations

1. Cuthbert, Francesca J. and Linda R. Wires. 1999. Caspian Tern (*Sterna caspia*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 17 March 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/403> [doi:10.2173/bna.403](https://doi.org/10.2173/bna.403)
 2. Ludwig, J. P. 1991. Caspian Tern. *in* The atlas of breeding birds of Michigan. (Brewer, R., G. A. McPeck, and R. J. Adams, Jr., Eds.) Michigan State Univ. Press, East Lansing.
- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Caspian Tern

BIOPID 169

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1419	BRIDGE OVER WATER	Undissolved	1
5200	NATURAL LAKES	Undissolved	1
5300	ARTIFICIAL LAKES	Undissolved	1
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
5420	DREDGED LAGOON	Undissolved	1
5430	ATLANTIC OCEAN	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1
6240	HERBACEOUS WETLANDS	Undissolved	1
7100	BEACHES	Undissolved	1
7440	DISTURBED TIDAL WETLANDS	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Caspian terns forage almost exclusively on fish, which they capture by dive bombing into open waters. The land based habitat, as well as mudflats, that are valued are important for foraging birds to use as a resting location between foraging forays and also as a connector between important water patches. It is also where the adults will feed the young (Cuthbert & Wires 1999).

Caspian terns are very infrequent nesters in this state. However, the nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Patch type Limited Extent allows for the habitat that is most likely used to be by the associated colony (which is based on our understanding of foraging commutes) to be valued without extending it to areas that are less likely to be used.

Literature Citations

1. Cuthbert, Francesca J. and Linda R. Wires. 1999. Caspian Tern (*Sterna caspia*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 17 March 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/403>
[doi:10.2173/bna.403](https://doi.org/10.2173/bna.403)

Land Use Land Cover Selections and Patch Type Justifications

Cattle Egret

BIOPID 200

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1-3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1-3
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1-3
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1-3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1-3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1-3
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1-3
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1-3
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1-3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1-3
7440	DISTURBED TIDAL WETLANDS	Undissolved	3

Land Use - Land Cover Selection and Patch Type Rationale

Cattle egrets use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in shrubs (such as marsh elder, *Iva frutescens*), trees (such as black cherry, *Prunus serotina*), and in the Atlantic coastal marsh islands (Burger 1978, Mora & Miller 1998, Telfair 2006). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Telfair 2006, Davis expert opinion).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. Cattle egrets have become infrequent nesters in the state but the habitats they would occur in are surveyed regularly and colonies are easily delineated when observed. It is therefore satisfactory to capture the breeding birds' habitat without overvaluing areas of the state. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only identify habitats valued by this species.

Literature Citations

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3. Telfair II, Raymond C. 2006. Cattle Egret (*Bubulcus ibis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 12 April 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/113doi:10.2173/bna.113>

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Cattle Egret

BIOPID 201

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
2100	CROPLAND AND PASTURELAND	Undissolved	2,3
2400	OTHER AGRICULTURE	Undissolved	2,3
5412	TIDAL MUD FLAT	Undissolved	3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1,3
6210	DECIDUOUS WOODED WETLANDS	Undissolved	3
6220	CONIFEROUS WOODED WETLANDS	Undissolved	3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	3
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	3
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	3
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	3
7440	DISTURBED TIDAL WETLANDS	Undissolved	3

Land Use - Land Cover Selection and Patch Type Rationale

Cattle egrets consume a variety of prey items including insects (such as grasshoppers, crickets and moths), spiders, frogs and fish. Unlike many of the other long-legged wading birds, this species uses both aquatic and terrestrial habitats for foraging on a regular basis. Terrestrial habitats include agricultural areas such as fields, where they are frequently observed hunting (Cunningham 1965, Singh et. al 1988, Telfair 2006).

Cattle Egrets have become infrequent nesters in this state. However, the nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Patch type Limited Extent allows for the habitat that is most likely used to be by the associated colony (which is based on our understanding of foraging commutes) to be valued without extending it to areas that are less likely to be used.

Literature Citations

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2. Singh, N., N. Sodhi, and S. Khera. 1988. Biology of the Cattle Egret *Bubulcus ibis coromandus* (Boddaert). Records of the Zoological Survey of India 104:1-143.
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[doi:10.2173/bna.113](https://doi.org/10.2173/bna.113)

Land Use Land Cover Selections and Patch Type Justifications

Cerulean Warbler

BIOPID 53

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	3,6
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	3,6
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1,3,4,5,6
1800	RECREATIONAL LAND	Dissolved	1,3,4,5,6
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,3,4,5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,2,3,4,5,6
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,3,4,5
4230	PLANTATION	Dissolved	1,3,4,5
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1,2,3,4,5,6
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1,2,3,4,5,6
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1,2,3,4,5,6
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1,2,3,4,5,6
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1,3,4,5,6
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1,3,4,5,6
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1,3,4,5,6

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,2,3,4,5,6</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,2,3,4,5</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1,3,4,5</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,3,4,5,6</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,3,4,5,6</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,3,4,5,6</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,3,4,5,6</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3,4,5,6</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3,4,5,6</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3,4,5,6</i>

Land Use - Land Cover Selection and Patch Type Rationale

Cerulean Warblers breed in mature forests with large, tall, well-spaced deciduous trees, especially white oak, with greater understory cover and less midstory cover; habitats include wet bottomlands, mesic forest slopes, dry ridge tops, and second-growth forests (Buehler et al. 2020). In the Highlands region, they prefer areas that are at least 50% forested, deciduous, and mixed and occasionally coniferous. Suitability also increases with proximity to larger, contiguous forest patches in this region (Rosenberg et al. 1999), and open-canopy forested areas such as those resulting from shelterwood or seed tree cuts, are important for breeding habitat (Wood et al. 2013). Breeding individuals in New Jersey have been observed in mature forest with canopy gaps, open-canopy forests, as well as many shrubby habitats adjacent to mature forests, including shrubby utility rights-of-way and regenerating shelterwood and seed tree cuts (Petzinger expert opinion). This species is area sensitive and somewhat negatively impacted by urban intensity with a 6-km scale of effect (Paton et al. 2019).

During the post-fledging/pre-migration period in Indiana, Cerulean Warblers were found in areas with high vegetation density, especially grapevines, but low basal area and abundance of mature trees, which include clearcuts, patch cuts, and riparian areas (Delancey and Islam 2019). In Pennsylvania, habitat use post-fledging varied with number of days post-fledging but ranged from areas with greater sapling cover and shorter canopy height compared to nesting habitat to areas similar to nesting habitat. This suggests that breeding Cerulean Warblers depend on mature forests and require forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Although Cerulean Warblers do not use urban areas while breeding, LULC 1700 (Other urban or built up land) was included as habitat because some habitat types, including grasslands and regenerating forest stands, have been misclassified as this LULC.

Cerulean Warblers are area sensitive forest-interior birds but minimum patch size depends on the amount of forest cover in the landscape (Buehler et al. 2020, Wood et al. 2013). Therefore, a minimum patch size will not be applied to Cerulean Warbler breeding habitat. Patch type Cardinal-Proximate is applied because breeding populations need large forest tracts in addition to shrubby areas in order to breed, which are cardinal habitats and dissolved, but also use powerlines and forest edges within larger tracts of forest, which are proximate.

Literature Citations

1. Buehler, D. A., P. B. Hamel, and T. Boves (2020). Cerulean Warbler (*Setophaga cerulea*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.cerwar.01>
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6. ENSP Biologist expert opinion – S. Petzinger

Land Use Land Cover Selections and Patch Type Justifications

Cerulean Warbler

BIOPID 55

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	2
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	2
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	2
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,2
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	2
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,2
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	2
1800	RECREATIONAL LAND	Undissolved	2
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2
4230	PLANTATION	Undissolved	1,2
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,2

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,2</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1,2</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1,2</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

During migration, Cerulean Warblers are typically found in forests and shrubby habitats, including forest canopy gaps, forest edges, and semi-open areas (Buehler et al. 2020). Based on sightings reported to eBird.org, Cerulean Warblers stopping in New Jersey during migration have also been observed in small patches of forests, urban parks, and residential areas that retain some trees.

Patch type Limited Extent is applied because Cerulean Warblers are not areas sensitive while migrating – they will also use small patches of forest/shrubland within and/or surrounded by residential areas.

Literature Citations

1. Buehler, D. A., P. B. Hamel, and T. Boves (2020). Cerulean Warbler (*Setophaga cerulea*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.cerwar.01>
2. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Chimney Swift

BIOPID 340

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1110	RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING	Undissolved	1
1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	Undissolved	1
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	1
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	1
1150	MIXED RESIDENTIAL	Undissolved	1
1200	COMMERCIAL/SERVICES	Undissolved	1
1211	MILITARY RESERVATIONS	Undissolved	1
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Undissolved	1
1300	INDUSTRIAL	Undissolved	1
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1
1440	AIRPORT FACILITIES	Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1
1499	STORMWATER BASIN	Undissolved	1

1500	INDUSTRIAL/COMMERCIAL COMPLEXES	Undissolved	<i>1</i>
1600	MIXED URBAN OR BUILT-UP LAND	Undissolved	<i>1</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1</i>
1710	CEMETERY	Undissolved	<i>1</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1</i>
1741	PHRAGMITES DOMINATE URBAN AREAS	Undissolved	<i>1</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1</i>
1800	RECREATIONAL LAND	Undissolved	<i>1</i>
1810	STADIUM THEATERS CULTURAL CENTERS AND ZOOS	Undissolved	<i>1</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1</i>

4230	PLANTATION	Undissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1
5200	NATURAL LAKES	Undissolved	1
5300	ARTIFICIAL LAKES	Undissolved	1
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Chimney Swifts are often found nesting in chimneys, silos, old open wells and other structures and abandoned buildings as well as hollow trees, tree cavities, and caves. They forage over open water, wetlands, early successional habitat, lawns, and low-density residential areas in addition to above buildings and trees.

Because of the multitude of habitat types used for nesting and/or foraging chimney swifts, including residential, industrial, and abandoned buildings, patch type Limited Extent is applied so the habitat types would not be dissolved. In doing so, the extent of habitat valued by a breeding individual would be limited to the breeding/foraging location.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Cliff SwallowBIOPID 218REGION StatewidePATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1419	BRIDGE OVER WATER	Dissolved	1
2400	OTHER AGRICULTURE	Dissolved	1
5100	STREAMS AND CANALS	Dissolved	1
5200	NATURAL LAKES	Dissolved	1
5300	ARTIFICIAL LAKES	Dissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Historically, cliff swallows nested on cliff faces that had horizontal overhanging rocks that provided protection to the nest. More recently cliff swallows have adapted to using man-made structures for nesting. They currently use buildings and bridges and therefore have been able to exploit many more habitat types including grasslands, agricultural fields, towns, riparian edges and areas of fragmented forests (Brown and Brown 1995).

In New Jersey, the majority of cliff swallow colonies are located on bridges over rivers and other water bodies. The largest colonies are located on bridges over the upper Delaware River (Valent expert opinion). Proximity to a mud source for nest building appears to be an important factor in colony location.

Most cliff swallow locations in the Biotics database are associated with a nesting colony and therefore the Contiguous Area patch type is appropriate as it values suitable nesting habitat using the LULC classes listed above within the species occurrence area. Since cliff swallows will use a wide variety of habitat types for foraging and will travel a considerable distance from their nesting colony only nesting habitat is valued for this species as it is assumed that suitable foraging habitat will be located near the colony site.

Literature Citations

1. Brown, Charles R. and Mary B. Brown. 1995. Cliff Swallow (*Petrochelidon pyrrhonota*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/149>
[doi:10.2173/bna.149](https://doi.org/10.2173/bna.149)

* ENSP biologist expert opinion – M. Valent

Land Use Land Cover Selections and Patch Type Justifications

Common Nighthawk

BIOPID 56

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	Undissolved	1,2
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	1,2
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	1,2
1150	MIXED RESIDENTIAL	Undissolved	1,2
1200	COMMERCIAL/SERVICES	Undissolved	1,2
1300	INDUSTRIAL	Undissolved	1,2
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1,2
1440	AIRPORT FACILITIES	Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1
1499	STORMWATER BASIN	Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1,2
1800	RECREATIONAL LAND	Undissolved	1,2
1804	ATHLETIC FIELDS (SCHOOLS)	Undissolved	1,2

2100	CROPLAND AND PASTURELAND	Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1
2400	OTHER AGRICULTURE	Undissolved	1
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4230	PLANTATION	Undissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1,2
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1
5200	NATURAL LAKES	Undissolved	1,2
5300	ARTIFICIAL LAKES	Undissolved	1,2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1,2
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1

6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
7100	BEACHES	Undissolved	<i>1</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1</i>
7400	ALTERED LANDS	Undissolved	<i>1</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Common Nighthawks nest on the ground in open areas but near logs, boulders, clumps of grasses or shrubs, or small patches of sandy gravel near debris, which includes coastal sand dunes and beaches, grasslands, farm fields, open-canopy forests and canopy gaps after logging or burning, rock outcrops, and flat gravel rooftops of buildings in urban areas (Brigham et al. 2020).

Nesting areas are chosen secondarily in association with large trees for roosting and abundance flying insects for food. Common Nighthawks forage while in flight, between 1 m above water and 80 m at forest canopy height, and commonly forage on insects over water as well as areas with a lot of artificial lighting.

In New Jersey, Common Nighthawks were reported during the breeding season along forest edges and in cities, suburban and rural residential areas, especially near parks, rivers, and reservoirs (eBird.org).

Because of the large breeding SOA and the multitude of habitat types used by Common Nighthawks for nesting and foraging, including urban areas, patch type Limited Extent was chosen so the habitat types would not be dissolved. In doing so, the extent of habitat valued by a breeding individual would be limited to the breeding territory.

Literature Citations

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2. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Common Tern

BIOPID 170

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1-4
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-4
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1,3,5
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1-4
6240	HERBACEOUS WETLANDS	Undissolved	2,3,4
7100	BEACHES	Undissolved	1,3,5
7440	DISTURBED TIDAL WETLANDS	Undissolved	3

Land Use - Land Cover Selection and Patch Type Rationale

Common terns nest in Atlantic coastal marsh islands on mats of wracks. They can also occur on beaches, often near inlets, but are more commonly found in the marsh. Their nests are small divots in the wrack or on the sand. They nest colonially and quite often share nesting areas with Black Skimmers (Andrews 1990, Burger & Gochfeld 1990, Nisbet 2002, Storey 1987, Trull et. al 1999). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Nisbet 2002, Davis expert opinion).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. Common terns are regularly surveyed in NJ and their distribution is well understood. It is therefore satisfactory to capture the breeding birds' habitat without overvaluing areas of the state. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only identify habitats valued by this species.

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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Common Tern

BIOPID 171

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1419	BRIDGE OVER WATER	Undissolved	*
5200	NATURAL LAKES	Undissolved	1,3
5300	ARTIFICIAL LAKES	Undissolved	1,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1,3,4
5411	OPEN TIDAL BAYS	Undissolved	1,3
5412	TIDAL MUD FLAT	Undissolved	4
5420	DREDGED LAGOON	Undissolved	4
5430	ATLANTIC OCEAN	Undissolved	*
6111	SALINE MARSHES (LOW MARSH)	Undissolved	*
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	*
6240	HERBACEOUS WETLANDS	Undissolved	*
7100	BEACHES	Undissolved	2

Land Use - Land Cover Selection and Patch Type Rationale

Common terns forage almost exclusively on fish, which they obtain by dive bombing into open bodies of water, including the ocean, bays, inlets, lakes and rivers (Duffy 1986, Nisbet 1983, Safina et. al 1988, Trull et. al 1999). The land based habitat, as well as mudflats, are valued as important for foraging birds to use as a resting location between foraging forays and also as a connector between important water patches. It is also where the adults will feed the young.

This is a well-surveyed, and the nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Patch type Limited Extent allows for the habitat that is most likely used to be by the associated colony (which is based on our understanding of foraging commutes) to be valued without extending it to areas that are less likely to be used. One LULC type was selected as "Riparian Undissolved" since it is not a habitat they will utilize unless it is adjacent to water.

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1. Duffy, D. C. 1986. Foraging at patches: interactions between Common and Roseate Terns. *Ornis Scandinavica*. 17:47-52.
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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Eastern Meadowlark

BIOPID 58

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Dissolved	<i>1,2,3,4,5,6,7</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2,3,4,5</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2,3,4,5</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1,2,3,4,5,6,7</i>
1800	RECREATIONAL LAND	Dissolved	<i>1,2,3,4,5,6,7</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1,2,3,4,5,6,7</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1,2,3,4,5,6,7</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1,2,3,4,5,6,7</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1,2,3,4,5</i>
2400	OTHER AGRICULTURE	Dissolved	<i>1,2,3,4,5</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>3</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>3</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2,3,4,5,6,7</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>2,3</i>

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>2,3</i>
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	<i>1,2,3,4,5</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4,5,6,7</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3,4,5</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1,2,3,4,5</i>
7400	ALTERED LANDS	Dissolved	<i>1,2,3,4,5</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1,2,3,4,5,6,7</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1,2,3,4,5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Breeding Eastern Meadowlarks are obligate grassland birds that evolved with large open native grasslands with different vegetation components to successfully breed, including high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance; Askins 2002). Meadowlarks nest on the ground in dense vegetation and prefer areas with good grass and litter cover (Jaster et al. 2022). Suitable breeding habitat for Eastern Meadowlarks include grasslands, pastures, savannas, as well as hayfields, grassy areas within cropland, airports, fallow fields, orchards, golf courses, reclaimed mines, and shrubby overgrown fields to nest, forage and raise their young (Jaster et al. 2022). They prefer larger grassland areas with few shrubs and trees but will use smaller (10-acre) fields as well as tall trees in fields for singing (Jaster et al. 2022, Hull 2002). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010). The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008).

Most grassland habitats in New Jersey are an artifact of other land uses, such as hayfields and sod farms, airports, and landfills, and all require some type of active management (mowing or burning) to remain suitable as grassland habitat (Petzinger expert opinion). In New Jersey, Eastern Meadowlarks have been observed during the breeding season in agricultural fields and pastures, airports, landfills, marshes, and parks (Petzinger expert opinion, eBird.org).

Patch type Contiguous Area is selected for Eastern Meadowlarks due to their preference for larger areas, dynamic nature of grassland birds needing to change locations once habitats become unsuitable, and their ability to use suitable habitat adjacent to many urban LULCs and cross roads/runways, rural residential areas, and other open non-habitats that separate what would be an otherwise contiguous habitat.

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6. ENSP Biologist Expert Opinion – S. Petzinger
7. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Eastern Whip-poor-will

BIOPID 82

REGION Statewide

PATCH TYPE CP*.1 Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved and Adjacent Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved and Adjacent Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved and Adjacent Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	1,2
2100	CROPLAND AND PASTURELAND	Undissolved and Adjacent Undissolved	1,2
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	1,2
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	1,2
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Adjacent Undissolved	1,2
2400	OTHER AGRICULTURE	Undissolved and Adjacent Undissolved	1,2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2

4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4230	PLANTATION	Dissolved	<i>1,2</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved and Adjacent Undissolved	<i>1,2</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	<i>2</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	<i>2</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	<i>2</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>1,2</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>2</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>2</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	<i>1</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>2</i>

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>2</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>2</i>
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Eastern Whip-poor-wills breed in dry deciduous, mixed, and coniferous forests with open canopies and little or no underbrush, including a variety of semi-open habitats, including farmlands, powerline and roadway corridors, clearcut and selectively logged forest, old fields, and reclaimed surface mines; they can also be found along forest edges of wet marshes (Cink et al. 2020). The degree of canopy and understory openness is more important than forest composition, as Whip-poor-wills are not found in extensive, closed-canopy forests and also tend to avoid small woodlots, but prefer close proximity to open areas for foraging (Cink et al. 2020). However, habitats used for roosting, nesting, and foraging tend to differ in understory and canopy cover, with foraging habitats requiring open-canopy and low understory/sapling cover, nesting habitat requiring open-canopy and high understory/sapling cover, and roosting habitat requiring more closed-canopy and high understory/sapling cover (Spiller et al. 2022). This suggests that breeding Eastern Whip-poor-wills depend on forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Little is known about the migratory stopover habitat of Eastern Whip-poor-wills, but it is thought to be the same type of habitat used for breeding, at least in the US (Cink et al. 2020). Because of that, the breeding and non-breeding populations are assigned the same LULC selections and patch type.

The patch type Cardinal-Proximate is applied because Eastern Whip-poor-wills will use a wide array of habitat types but have definite preferences for nesting, roosting, and foraging. Under this patch type, LULCs that represent open-canopy forests used for nesting are cardinal types and dissolved, while closed-canopy forests and herbaceous/agricultural fields used for roosting and foraging are adjacent undissolved.

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<https://doi.org/10.5751/JFO-00057-930106>

Land Use Land Cover Selections and Patch Type Justifications

Field Sparrow

BIOPID 341

REGION Statewide

PATCH TYPE CP.*6 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved and Adjacent Dissolved	<i>1,2</i>
1800	RECREATIONAL LAND	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
2100	CROPLAND AND PASTURELAND	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved and Adjacent Dissolved	<i>1</i>
2400	OTHER AGRICULTURE	Dissolved and Adjacent Dissolved	<i>1</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved and Adjacent Dissolved	<i>1,2,3</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1,2,3</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1,2,3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved and Adjacent Dissolved	<i>1,2,3</i>

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved and Adjacent Dissolved	<i>1</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved and Adjacent Dissolved	<i>1</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved and Adjacent Dissolved	<i>1</i>
6240	HERBACEOUS WETLANDS	Dissolved and Adjacent Dissolved	<i>1</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved and Adjacent Dissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Field sparrows breed in successional old fields, woodland openings and edges, roadsides and railroads near open fields provided the areas contain scattered woody vegetation. Although they do not breed near residential areas, they are occasionally found in Christmas tree farms, orchards, and nurseries (Carey et al. 2020).

In New Jersey, Field Sparrows are commonly found breeding in powerline rights-of-way and hedgerows in grasslands (including landfills and airports) as well as regenerating open-canopy forests after seed tree silvicultural prescriptions (Petzinger expert opinion). While Field Sparrows are not area sensitive, they are only reported breeding near residential areas when other habitat, such as fields, shrublands, powerlines, or wetlands are present (eBird).

Although Field Sparrows do not use urban areas while breeding, LULC 1700 (Other urban or built up land) was included as habitat because some habitat types, including grasslands and regenerating forests, have been misclassified as this LULC.

Because Field Sparrows use field/shrub-forest edge habitat but not closed-canopy upland forests, the Cardinal-Proximate patch type was chosen as the best representation to depict suitable habitat without valuing vast areas of unsuitable habitat but also capturing the habitat used by the breeding population represented by observations, especially patches of early successional habitat scattered throughout a closed-canopy forest. Closed-canopy forest by itself is not suitable habitat but is suitable when adjacent to primary habitat types. Occasionally regenerating forests with 30% canopy cover have been misclassified as forests with >50% canopy cover.

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2. ENSP Biologist expert opinion – S. Petzinger
3. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Glossy Ibis

BIOPID 198

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	<i>1</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>2-4,6,7</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>2-4,6,7</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>1,6</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	<i>2-4,6</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-5,7,8</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-5,7</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-5,7,8</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-5,7</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-5,7</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-5,7</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-5,7,8</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-5,7</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Glossy ibis use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in shrubs (such as marsh elder, *Iva frutescens*), trees (such as black cherry, *Prunus serotina*), and in the Atlantic coastal marsh islands (Beaver et. al 1980, Cramp & Simmons 1977, Hancock et. al 1992, Palmer 1962, Post et. al 1970, Spendalov & Patton 1988, Stevenson & Anderson 1994, Wiese 1979). They have also been documented nesting in phragmites (*Phragmites australis*) (Davis expert opinion). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Beaver et. al 1980, Davis expert opinion).

Patch type Limited Extent is selected for this species. They are a well surveyed species that nests in discrete colonies that are easily demarcated. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only highlight habitats being used by this species. Therefore this patch type, which does not dissolve LULC polygons, is the best fit for this species.

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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Glossy Ibis

BIOPID 199

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	1-3,6
5200	NATURAL LAKES	Undissolved	1-3,6
5300	ARTIFICIAL LAKES	Undissolved	1-3,6
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1-3,6
5411	OPEN TIDAL BAYS	Undissolved	1-3,6
5412	TIDAL MUD FLAT	Undissolved	1
5420	DREDGED LAGOON	Undissolved	1-3,6
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2,4
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2,4
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	2,4
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	5-8
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	7,8
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	5-8
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	7,8
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	5-8

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	7,8
6240	HERBACEOUS WETLANDS	Riparian Undissolved	*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	5-8
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	7,8
7440	DISTURBED TIDAL WETLANDS	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Glossy ibis forage on invertebrates, including aquatic beetles and insect larvae, and small mollusks, such as mussels and clams. They will use open water to stalk aquatic prey in and will hunt in marshes, on mudflats and forest edges associated with wetlands for many of the other items they eat (Davis & Kricher 2000, Erwin 1983, Hancock et. al 1992, Master 1992, Palmer 1962, Stevenson & Anderson 1994, Wiese 1979, Williams 1975).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in easily demarcated colonies. These colonies serve as the base for the foraging models and this makes it fairly easy to identify and map the areas likely to be used for foraging around any given colony. This patch type allows for the habitat that is most likely used to be valued without extending it to areas that are less likely to be used. In an additional effort to avoid valuing habitat that is not used by this species, some LULC polygons are coded "Riparian Undissolved" so that they are only valued when adjacent to water, and therefore more attractive to this species.

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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Golden-winged Warbler

BIOPID 60

REGION Statewide

PATCH TYPE CP*.1 Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2,3,4,5,6</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2,3,4,5,6</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1,2,3,4,5,6</i>
1800	RECREATIONAL LAND	Dissolved	<i>1,2,3,4,5,6</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1,2,3,4,5,6</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2,3,4,5,6</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2,3,4,5,6</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2,3,4,5,6</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2,3,4,5,6</i>

4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2,3,4,5,6</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4,5,6</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4,5,6</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4,5,6</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,2,3,4,5,6</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,2,3,4,5,6</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4,5,6</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4,5,6</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3,4,5,6</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3,4,5,6</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3,4,5,6</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3,4,5,6</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3,4,5,6</i>

Land Use - Land Cover Selection and Patch Type Rationale

Golden-winged Warblers are considered area-sensitive forest-dependent birds negatively impacted by urban intensity with a 2-km scale of effect (Paton et al. 2019). They nest in highly forested areas containing dense patches of herbs (48-73% herb cover) and shrubs (45-69% shrub cover) with some taller trees (6% to 45% tree cover); these habitats include regenerating clearcuts, shrub swamps, and forest edges (Aldinger et al. 2015, Confer et al. 2020) as well as abandoned farmland, shrubland, scrub barrens, beaver wetlands, swamp forests with partial canopies, and utility rights-of-way (Aldinger et al. 2015). Breeding territories can be in uplands or wetlands, but in many locations, including New Jersey, are often in or near wetlands dominated by alders (*Alnus* spp.) or willows (*Salix* spp.), and sometimes forested wetlands; In s. New York and adjacent New Jersey, Golden-winged Warblers, but rarely Blue-winged Warblers, nest in swamp forests that are dominated by red maple in the canopy and tussock sedge in the herb layer with a dry, forested edge (Confer et al. 2020). Golden-winged warbler breeding home ranges expand beyond the nesting territory and include mature forests with semi-open canopies (65-72% canopy cover) containing shrubs, saplings, and herbaceous ground cover (Aldinger et al. 2015, Frantz 2013, Frantz et al. 2016).

In New Jersey, Golden-winged Warbler breeding territories were mostly observed in areas with >76% forest cover, low agriculture (<3%), low (<10%) residential development, and at elevations ranging from 406 to 1,271 feet (Petzinger expert opinion). They have been in upland and wetland habitats but seem to prefer to breed in or near areas with mesic or hydric soils, especially in utility rights-of-way, beaver wetlands, and regenerating open-canopy forests (10-25% tree canopy cover); Golden-winged Warblers are also occasionally found breeding in shrub swamps, wetland forests, abandoned farms/residences, and shrubby fields (Petzinger expert opinion).

Fledglings used forests of multiple age classes after leaving the nest provided those forests contained open canopies (<50% canopy cover) and dense understory vegetation (Fiss 2017). Chicks used early successional forest habitat (1-10 years post-disturbance) soon after leaving the nest, then moved to slightly later successional forests (11-25 years post-disturbance) as they aged; both habitat types were used more often than closed-canopy mature forests and forest edges (Aldinger et al. 2015) but chicks moved through mature forests to travel to other suitable early successional habitat with dense woody regeneration (Fiss 2017). This suggests that breeding Golden-winged Warblers depend on forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Although Golden-winged Warblers do not use urban areas while breeding, LULC 1700 (Other urban or built up land) was included as habitat because some habitat types, including grasslands and regenerating forest stands, have been misclassified as this LULC.

Patch type Cardinal-Proximate is applied to account for the area sensitivity while limiting the amount of forested habitat valued by breeding occurrences. Wetlands, open-canopy forest, and shrubby areas are the cardinal habitats while closed-canopy forest will be valued only if adjacent to the cardinal habitats.

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Land Use Land Cover Selections and Patch Type Justifications

Golden-winged Warbler

BIOPID 359

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	<i>2</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>2</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1,2</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>2</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1,2</i>
1800	RECREATIONAL LAND	Dissolved	<i>1,2</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1,2</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,2</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,2</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Migratory habitat use of Golden-winged Warblers is poorly documented but they use forest edges and tall second-growth, including along the coast, while on the wintering grounds they use semi open-canopy forests, canopy gaps, and forest edges, including riparian forests (Confer et al. 2020).

In New Jersey, migrant golden-winged warblers have been reported in shrubby areas, old fields, and forested edges, including parks and small patches of forests and shrubs surrounded by urban areas, and occasionally reported in backyards (eBird.org).

The patch type Cardinal-Proximate is applied because Golden-winged Warblers are not area sensitive during migration and prefer specific habitat types such as shrubby habitats and forest edges. Under this patch type, LULCs that represent these preferred habitats are dissolved, LULCs that represent other habitat are undissolved, and LULCs that represent edge habitat, like closed-canopy forests, are adjacent undissolved.

Literature Citations

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2. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Grasshopper Sparrow

BIOPID 61

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Dissolved	<i>1,2,3,4,5,6,7,8</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>2,3,6</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	<i>2,3,6</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>2,3,6</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1,2,3,4,5,6,7,8</i>
1800	RECREATIONAL LAND	Dissolved	<i>1,2,3,4,5,6,7,8</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1,2,3,4,5,6,7,8</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1,2,3,4,5,6,7,8</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1,2,3,4,5,6,7,8</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1,2,3,4,5,6,7,8</i>
2400	OTHER AGRICULTURE	Dissolved	<i>1,2,3,4,5,6,7,8</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6,7,8</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6,7,8</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6,7,8</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6,7,8</i>

4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2,3,4,5,6,7,8</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>2,3,6</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>2,3,6</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>2,3,6</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>2,3,6</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8</i>
7300	EXTRACTIVE MINING	Dissolved	<i>6</i>
7400	ALTERED LANDS	Dissolved	<i>1,2,3,4,5,6,7,8</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1,2,3,4,5,6,7,8</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8</i>

Land Use - Land Cover Selection and Patch Type Rationale

Breeding Grasshopper Sparrows are area-sensitive, obligate grassland birds that evolved with large open native grasslands with different vegetation components to successfully breed, including high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance (Askins 2002). Grasshopper Sparrows nest on the ground, often in or near grass clumps and shrubs, and prefer open grasslands with patchy bare ground (Vickery 2020). Suitable breeding habitat for Grasshopper Sparrows include native grasslands, fallow fields, and hayfields, as well as airports, savannas, reclaimed mines, and blueberry barrens to nest, forage and raise their young (Vickery 2020). They tend to avoid extensive shrub cover but have been known to breed in habitats with shrubs (Vickery 2020, Dechant et al. 2002). Grasshopper Sparrows also prefer larger grassland areas (100 ha in Maine) but will use smaller fields a few hectares in size (Vickery 2020). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010). The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008).

Most grassland habitats in New Jersey are an artifact of other land uses, such as hayfields and sod farms, airports, and landfills, and all require some type of active management (mowing or burning) to remain suitable as grassland habitat (Petzinger expert opinion). In New Jersey, Grasshopper Sparrows are found breeding in agricultural areas, airports, landfills, parks (Petzinger expert opinion, eBird.org), and even shrubland habitat types at a rate that indicates active selection of that habitat type (ENSP 2010).

Patch type Contiguous Area is selected for Grasshopper Sparrows due to their preference for larger areas, dynamic nature of grassland birds needing to change locations once habitats become unsuitable, and their ability to use suitable habitat adjacent to many urban LULCs and cross roads/runways, rural residential areas, and other open non-habitats that separate what would be an otherwise contiguous habitat.

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7. ENSP Biologist Expert Opinion – S. Petzinger
8. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Grasshopper Sparrow

BIOPID 360

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	<i>1,2</i>
1200	COMMERCIAL/SERVICES	Undissolved	<i>2</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>2</i>
1440	AIRPORT FACILITIES	Undissolved	<i>2</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1,2</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1,2</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1,2</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1,2</i>
1800	RECREATIONAL LAND	Undissolved	<i>1,2</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1,2</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1,2</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1,2</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1,2</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1,2</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1,2</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,2</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1,2</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1,2</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1,2</i>
7400	ALTERED LANDS	Undissolved	<i>1,2</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1,2</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Grasshopper Sparrow migratory stopover habitat is similar to breeding habitats, which includes native grasslands, fallow fields, and hayfields, as well as airports, savannas, reclaimed mines, and blueberry barrens (Vickery 2020).

In New Jersey, reported sightings of migrating Grasshopper Sparrows are found in agricultural areas, airports, landfills, parks, and shrubby areas (eBird.org).

Patch type Limited Extent is selected for migrating Grasshopper Sparrows because they are less area sensitive and are more likely to use small fields surrounded by urban areas and some backyards, including the Rutgers University Newark Campus (eBird.org).

Literature Citations

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2. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Great Blue Heron

BIOPID 172

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
6120	FRESHWATER TIDAL MARSHES	Undissolved	1,2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,2
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Great blue herons utilize a wide variety of forested habitats for nesting. They will nest in lowland swamp, wetland and upland forests (Butler 1992, Spendalow & Patton 1988). They will use many species of trees for substrate and although they can nest near the ground, in New Jersey they often nest higher in the canopy. They almost always nest in colonies, though there are exceptions of one pair "colonies". The colonies in New Jersey only consist of other great blue herons. Their colonies are often some distance away from human disturbance and nestled within a forested patch, though again, there are exceptions (Davis personal observation). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Butler 1992, Davis expert opinion).

Great blue herons are a fairly well surveyed species in the state and their distribution is variable throughout the state. Colonies can abandon and then reform in a nearby area or be active at the same location for many years. Due to these reasons, Patch type Limited Extent is selected for this species. The colonies are easily delineated and this patch type allows the habitat being utilized by the individuals in the SOA to be valued without overvaluing areas that are not critical to that nesting site. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only value habitats used by this species for nesting colonies.

Literature Citations

1. Butler, Robert W. 1992. Great Blue Heron (*Ardea herodias*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 7 May 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/025> [doi:10.2173/bna.25](https://doi.org/10.2173/bna.25)
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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Great Blue Heron

BIOPID 173

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	1
5200	NATURAL LAKES	Undissolved	1
5300	ARTIFICIAL LAKES	Undissolved	1
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
5420	DREDGED LAGOON	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1
6120	FRESHWATER TIDAL MARSHES	Undissolved	1
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	1
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	1
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	1

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Great blue herons are generalist predators that will forage on a wide variety of prey items, including fish, amphibians, and small reptile, mammals and other birds. They hunt for some of these items in and around aquatic environments such as lakes, rivers, ponds, streams and bays. More terrestrial based prey is acquired on hunting bouts in both shrubby and forested wetlands, and salt and freshwater habitats (Butler 1992).

Patch type Limited Extent is selected for this species. It is a reasonably well-surveyed species that nests in easily demarcated colonies. These colonies serve as the base for the foraging models and this makes it fairly easy to identify and map the areas likely to be used for foraging around any given colony. Great blue herons are capable of long foraging commutes, and patch type Limited Extent allows for the suitable habitat that is most often used to be valued (i.e. that nearest to the colony) without extending it to areas that are used less often. The LULC polygons that were "Riparian Undissolved" was applied denote those wooded wetlands areas that will likely only be used when adjacent to water.

Literature Citations

1. Butler, Robert W. 1992. Great Blue Heron (*Ardea herodias*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 7 May 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/025> doi:10.2173/bna.25

Land Use Land Cover Selections and Patch Type Justifications

Gull-billed Tern

BIOPID 178

REGION Statewide

PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	2,3
2100	CROPLAND AND PASTURELAND	Dissolved	1,3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	2,3
5200	NATURAL LAKES	Dissolved	3
5300	ARTIFICIAL LAKES	Dissolved	3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	3
5411	OPEN TIDAL BAYS	Undissolved	3
5412	TIDAL MUD FLAT	Dissolved	3
5420	DREDGED LAGOON	Dissolved	3
6111	SALINE MARSHES (LOW MARSH)	Dissolved	2,3
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2,3
6120	FRESHWATER TIDAL MARSHES	Dissolved	2,3
6130	VEGETATED DUNE COMMUNITIES	Dissolved	3,4
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	2,3
6240	HERBACEOUS WETLANDS	Dissolved	2,3

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	2,3
7100	BEACHES	Dissolved	3
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	2,3
7440	DISTURBED TIDAL WETLANDS	Dissolved	3

Land Use - Land Cover Selection and Patch Type Rationale

Gull-billed terns are colonially nesting terns that breed primarily in the marshes of New Jersey (Buckley & McCaffrey 1978, Molina et. al 2009, Davis expert opinion). Some birds choose to nest on beaches, usually amongst common tern and black skimmer colonies (Rohwer & Woolfenden 1968). Nests are laid on wrack mats in the marsh or directly on the sand on the beach. Unlike most other terns in New Jersey, gull-billed terns do not forage primarily on fish. Although they will take fish, they also hunt for prey items including insects, lizards, amphibians and occasionally other birds. Therefore, foraging areas include mudflats, salt marshes and the like in addition to open water (Molina et. al 2009). They have also been known to forage in agricultural fields (Bogiliani et. al 1990).

Patch type Contiguous Area is applied for this species. Gull-billed terns do not nest in large numbers in the state, leading to a moderate number of records, and only their Atlantic coastal marsh habitat is surveyed on a regular basis. Since their distribution is not fully understood and because their nesting and foraging habitat is so similar (though they use different areas for each) this patch type ensures that the habitat they are using for both behaviors (nesting and foraging) is properly valued.

Literature Citations

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 2. Buckley, F. G. and C. A. McCaffrey. 1978. Use of dredged material islands by colonial seabirds and wading birds in New Jersey. Technical Report D-78-1. U.S. Army Engineer Waterways Experimental Station Vicksburg, MS.
 3. Molina, K. C., J. F. Parnell and R. M. Erwin. 2009. Gull-billed Tern (*Sterna nilotica*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 7 May 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/140doi:10.2173/bna.140>
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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Henslow's Sparrow

BIOPID 63

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Dissolved	3,5
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	4
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	4
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	3,5
1800	RECREATIONAL LAND	Adjacent Undissolved	4
2100	CROPLAND AND PASTURELAND	Dissolved	1,2,3,4,5,6,7
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	2,3,4,5,6,7
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	4
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	2,3,4,5,6,7
6111	SALINE MARSHES (LOW MARSH)	Undissolved	4
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	4
6120	FRESHWATER TIDAL MARSHES	Undissolved	4
6240	HERBACEOUS WETLANDS	Dissolved	3,6
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	4

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agricultural areas, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008). Additionally, some LULC classes (e.g. brush/shrubland) are included as secondary habitat because they too can be reverted to suitable habitat relatively quickly. If these secondary habitats are adjacent to primary habitat, they increase the overall relative size of the grassland. This increase of size is important to most grassland bird species because they require large patches of habitat (Martin and Gavin, 1995; Askins 2002; Morgan and Burger 2008). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010).

Henslow's sparrows are considered a mature grassland species because their preferred breeding habitat is tall, dense vegetation with a thick litter layer and no bare ground that is typical of older grasslands (3-5 years without disturbance) (Bollinger 1995; Pruitt 1996; Peterjohn 2006). They are also frequently found using moist areas (Pruitt 1996, Herkert et al. 2002, Peterjohn 2006). In the eastern part of its range, preferred habitats include coastal marshes, swamps, dry fields, salt marshes, low wet meadows and upland weedy hayfields or pastures (Pruitt 1996, Herkert et al. 2002). In the Northeast, airports provide large areas of grassland habitat for grassland birds, including Henslow's sparrow (Morgan and Burger 2008).

Patch type Cardinal-Proximate is selected for Henslow's sparrows due to the dynamic nature of grassland birds preferred habitat resulting in their need to change locations once habitats become unsuitable (Askins 2002). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat for Henslow's sparrows. Grassland birds predominately use agricultural/grassland habitat but also use early successional edges. Therefore, grassland habitats were selected as cardinal and early-successional habitats were selected as proximate. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates Henslow's sparrows breeding, foraging and rearing young requirements. A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 1700 (other urban) especially when it is within airport complexes containing suitable grassland habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Henslow's Sparrow

BIOPID 64

REGION Statewide

PATCH TYPE LE.1 Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1440	AIRPORT FACILITIES	Undissolved	<i>4</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>6</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>6</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>4</i>
1800	RECREATIONAL LAND	Undissolved	<i>3</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1,2,3,4,5,6</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>2,3,5,6</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>3</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>2,3,4,5,6</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>6</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>6</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>6</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>3,6</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>3,6</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>3,6</i>

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	6
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	6
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	6
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	6
6240	HERBACEOUS WETLANDS	Undissolved	3,5,6
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	3,6
7440	DISTURBED TIDAL WETLANDS	Undissolved	3,6

Land Use - Land Cover Selection and Patch Type Rationale

Breeding and non-breeding habitat is similar for Henslow's sparrows. They are considered a mature grassland species as their preferred breeding habitat is tall, dense vegetation with a thick litter layer and no bare ground that is typical of older grasslands (3-5 years without disturbance) (Bollinger 1995; Pruitt 1996; Peterjohn 2006). Henslow's sparrows are also frequently found using moist areas (Pruitt 1996; Herkert et al. 2002; Peterjohn 2006) and may select those habitat types during non-breeding season (Pruitt 1996). In the eastern part of its range, preferred habitats include coastal marshes, swamps, dry fields, salt marshes, low wet meadows and upland weedy hayfields or pastures (Pruitt 1996; Herkert et al. 2002). In the Northeast, airports provide large areas of grassland habitat for grassland birds, including Henslow's sparrows (Morgan and Burger 2008). Although the migration habitat requirements for Henslow's sparrows have not been thoroughly researched, there is evidence that they also use shrub habitat (Pruitt 1996).

Patch type Limited Extent is selected for Henslow's sparrow observations during migration because during migration birds utilize small areas for short periods of time before they move southward. Therefore, the selected LULCs did not need to be dissolved. The resulting polygons value the habitat important to migrating Henslow's sparrows while limiting the extension into areas that are less likely to be used during migration.

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Land Use Land Cover Selections and Patch Type Justifications

Horned Lark

BIOPID 66

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Dissolved	2,4
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Adjacent Undissolved	2
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	2
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	2,3,4,6
1710	CEMETERY	Adjacent Undissolved	2
1800	RECREATIONAL LAND	Undissolved	2,3,4,6
2100	CROPLAND AND PASTURELAND	Dissolved	1,2,3,4,5,6,7
2140	AGRICULTURAL WETLANDS (MODIFIED)	Adjacent Undissolved	2
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	2
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	2
2300	CONFINED FEEDING OPERATIONS	Undissolved	2
2400	OTHER AGRICULTURE	Undissolved	2,3,4,6
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	2
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	2,3

6120	FRESHWATER TIDAL MARSHES	Undissolved	2
6240	HERBACEOUS WETLANDS	Undissolved	2
7100	BEACHES	Undissolved	2
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	2,3,6
7300	EXTRACTIVE MINING	Dissolved	2,3,6
7400	ALTERED LANDS	Dissolved	2,3
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	2,6
7440	DISTURBED TIDAL WETLANDS	Undissolved	2,6
7500	TRANSITIONAL AREAS	Dissolved	2,3,6
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	2,3,6

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands which are characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agriculture, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (i.e. field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULCs are not frequent enough to capture the changes to a given site (Morgan and Burger 2008). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010).

In New Jersey, Horned larks are year round residents and are considered disturbance-tolerant species (Peterjohn 2006). Breeding and non-breeding habitat are similar but during the winter months Horned larks increase the use of beaches and sand dunes and mowed areas such as airfields. In winter, horned larks will also make use of livestock feed lots and heavily grazed areas (Beason 1995).

Horned larks are typically the first breeding bird species to colonize bare ground by reclamation of surface mines, strip mines and newly seeded agricultural lands (Beason 1995; Peterjohn 2006). This species prefers to breed in barren ground, areas with little vegetation and fields of row crop stubble (Beason 1995; Dinkins et al. 2003).

Patch Type Cardinal-Proximate is selected for horned lark due to the dynamic nature of grassland birds preferred habitat resulting in their need to change locations once habitats become unsuitable (Askins 2002). To compensate for the changing nature of the agricultural lands they rely on, horned larks may change breeding locations once habitats become unsuitable (Peterjohn 2006; Askins, 2000; Shustack et al. 2010). Some areas that are suitable for nesting in early spring often become unsuitable by late spring or early summer because vegetation grows too tall (Beason 1995; Peterjohn 2006). When the habitat becomes unsuitable, "the birds generally abandon the area or forego further nesting" (Beason 1995). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates horned lark breeding, foraging and rearing young requirements. A final step was the selection of several LULC classed that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 1700 (other urban) especially when it is within airport complexes containing suitable grassland habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Kentucky Warbler

BIOPID 67

REGION Statewide

PATCH TYPE CP*.1 Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	1,2,4,5,6,7
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved and Adjacent Undissolved	1,2,4,5,6,7
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved and Adjacent Undissolved	1,2,4,5,6,7
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	1,2,4,5,6,7,8
1800	RECREATIONAL LAND	Undissolved and Adjacent Undissolved	1,2,4,5,6,7,8
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,4,5,6,7,8
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	1,2,3,5,7,8
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,4,5,6,7,8
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	1,2,3,5,7,8
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1,2,4,5,6,7,8
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	1,2,3,5,7,8
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1,2,4,5,6,7,8

4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2,3,5,7,8</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,4,5,6,7,8</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,4,5,6,7,8</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,4,5,6,7,8</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,2,4,5,6,7,8</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,2,3,5,7,8</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1,2,3,5,7,8</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,4,5,6,7,8</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,4,5,6,7,8</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,4,5,6,7,8</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,4,5,6,7,8</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3,5,7,8</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3,5,7,8</i>

Land Use - Land Cover Selection and Patch Type Rationale

Kentucky warblers breed in bottomland hardwoods and woods near streams with dense understory and well-developed ground cover for nest cover and foraging insects; the preferred canopy closure is unknown but this species seems to use forest edges, canopy gaps and other areas (paths or small roads through the forest) where light increases the shrub layer (McDonald 2020). Breeding densities of Kentucky Warblers were positively related to canopy height, ground litter, and understory density but not tree species (Bakermans et al. 2012) and increased after thinning the forest canopy with TSI (Wallendorf et al. 2007). Kentucky Warblers also breed in regenerating clearcuts 6-7 years post-management (McDonald 2020) and the density of breeding pairs were found to increase significantly post-clearcut both within the clearcut area as well as within the 100-meter forested buffer of the clearcut (Wallendorf et al. 2007). In Missouri, abundance of breeding Kentucky Warblers was highest in 9-year old regenerating oak clearcuts, then 3-year old regenerating oak clearcuts and riparian forests, and lowest in mature upland oak forests (Pagen et al. 2000).

Studies of forest fragmentation in Missouri indicate that blocks of suitable habitat (at least 500 ha) are necessary for successful breeding and an analysis of floristic, structural, isolation and area variables of forest fragments on the coastal plain of Maryland found that forest area, independent of its covariates, strongly affected presence/absence of Kentucky warblers (McDonald 2020). However, an analysis of spatial scale showed Kentucky Warblers are forest dependent but also somewhat positively associated with urban intensity with a 12 km scale of effect; they also occurred in areas that had less forest cover within 0.5 km than what was available, shrublands and wetlands excluded (Paton et al. 2019).

In New Jersey, Kentucky Warblers were reported during the breeding season in large forested areas as well as forest edges, parks, and riparian forests surrounded by residential development and agriculture (eBird.org). In the Sourland Mountains region of NJ, which is a closed-canopy forest (>80% forest canopy) interspersed with trails, breeding Kentucky Warblers appeared to select for areas with more native woody understory cover, which was predominately spicebush due to heavy deer browse (McGee and Van Clef unpublished). Based on this information, while Kentucky Warblers are forest dependent, they do not appear to be forest area sensitive.

Kentucky warbler chicks use regenerating clearcuts (3-9 years post-management) after leaving the nest (Pomeluzi et al. 2014) and abundance of Kentucky Warblers during the post-fledging period was highest in riparian forests, then 9-year old and 3-year old regenerating oak clearcuts, and none were in mature upland oak forests (Pagen et al. 2000). This suggests that breeding Kentucky Warblers depend on forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Although Kentucky Warblers do not use urban areas while breeding, LULC 1700 (Other urban or built up land) was included as habitat because some habitat types, including grasslands and regenerating forest stands, have been misclassified as this LULC.

Patch type Cardinal-Proximate is applied because patch type Limited Extent fails to value patches of suitable habitat adjacent to preferred habitat (< 100m away) that would likely be used by the local population represented but the documented species occurrence, and the species is not likely area-sensitive, so contiguous area would overvalue forest patches. Patch type Cardinal-Proximate also allows the LULCs representing preferred habitat to be dissolved without also dissolving all possible habitat types, and allows for edge habitats to be included without over-valuing the habitat types that create that edge.

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Land Use Land Cover Selections and Patch Type Justifications

Kentucky Warbler

BIOPID 68

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	1,2
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	1,2
1200	COMMERCIAL/SERVICES	Undissolved	1,2
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1,2
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,2
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1,2
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,2
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1,2
1800	RECREATIONAL LAND	Undissolved	1,2
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1,2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2
4230	PLANTATION	Undissolved	1,2
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,2

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,2
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,2
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1,2
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1,2
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,2
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1,2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2

Land Use - Land Cover Selection and Patch Type Rationale

Little is known about migratory stopover habitat of Kentucky warblers. They have been observed in coastal areas as well as suburban gardens and city parks and prefer to forage in the lower levels of trees and in dense foliage near the ground (McDonald 2020). Migratory sightings reported on eBird in New Jersey demonstrate similar habitat use, including a recapture of a Kentucky Warbler at the Rutgers University Newark Campus during spring migration (eBird.org).

Because so little is known about migratory stopover habitat and area needed for foraging during migration, and they will use urban/suburban areas, Patch Type Limited Extent will be applied.

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Land Use Land Cover Selections and Patch Type Justifications

King Rail

BIOPID 324

REGION Statewide

PATCH TYPE CA.4 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Dissolved	<i>1,3,4,5,6</i>
5190	EXPOSED FLATS	Dissolved	<i>1,3,4,5,6</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1,3,4,5,6</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1,3,4,5,6</i>
5412	TIDAL MUD FLAT	Dissolved	<i>1,3,4,5,6</i>
5420	DREDGED LAGOON	Dissolved	<i>1,3,4,5,6</i>
6111	SALINE MARSHES (LOW MARSH)	Dissolved	<i>1,3,4,5,6</i>
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	<i>1,3,4,5,6</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1,3,4,5,6</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	<i>1,3,4,5,6</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,3,4,5,6</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,3,4,5,6</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1,3,4,5,6</i>
6290	UNVEGETATED FLATS	Dissolved	<i>1,3,4,5,6</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1,3,4,5,6</i>

Land Use - Land Cover Selection and Patch Type Rationale

King rails are a species that utilizes both freshwater and brackish marshes (especially those with lower salinity) that feature a high degree of heterogeneity (Pickens and Meanley 2020). A marsh that features dense vegetation mixed with open water appears to be favored, so they can take advantage of a vegetation-water edge for foraging (Cornell Lab of Ornithology 2019). They have particular water depth preferences for nesting but have the ability to shift microhabitats to utilize optimal water depth in years that are wetter or drier (for example, by shifting the plants species they will nest in). Their nests can be in grasses, sedges, or cattails that are located in shallow water (10-46 cm). (Reid 1989, Tanner and Hendrickson 1956, Wayne 1910).

There are not a wide number of studies on home range of king rail, but one telemetry study of 22 individuals showed that their mean 95% kernel density home ranges varied from 4.4 ha $\pm$ 0.6 SE to 27.3ha $\pm$ 5.5 SE. Their 50% kernel density home range (i.e. core area) ranged from 0.89 ha $\pm$ 0.12ha to 4.99ha $\pm$ 0.62 SE. Home ranges were larger when open water was not available. Mean daily movements varied from 78.4 m $\pm$ 4.9 SE to 257.6 m $\pm$ 69.6 SE, but 4 individuals moved > 1 km. (Pickens and King 2013).

Patch type Contiguous Area is selected because it dissolves the LULC types the species is known to use into one patch and values the resulting habitat patch intersected by the SOA. The habitat used within the home range primarily consists of wetlands dominated by dense herbaceous vegetation so it is difficult to delineate (i.e. observers do not often see the extent to which they use an area). Moreover, many records consist of vocal observations. The Contiguous Area patch type, therefore, is appropriate as it ensures that all the suitable habitat in and around the likely home range will be valued.

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Land Use Land Cover Selections and Patch Type Justifications

Least Bittern

BIOPID 181

REGION Statewide

PATCH TYPE Contiguous Area

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5100	STREAMS AND CANALS	Dissolved	<i>2</i>
5200	NATURAL LAKES	Dissolved	<i>1,2</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>1,3</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>2</i>
5412	TIDAL MUD FLAT	Dissolved	<i>2</i>
6111	SALINE MARSHES (LOW MARSH)	Dissolved	<i>2,4</i>
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	<i>2,4</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>2-4</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>2</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>2</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Least bitterns are a highly secretive species that nest in freshwater and brackish marshes (Gibbs et. al 2009, Stewart & Robbins 1958, Swift 1989). They lay their eggs in emergent wetland substrate and spend the majority of their time hidden among the grass of the marshes they inhabit. They hunt a wide variety of prey items, including fish, herptiles, small mammals and insects, which they obtain in the same marsh habitats they nest in (Gibbs & Melvin 1990, Gibbs et. al 2009). Although secretive and not often observed in the open, they do use the edges of mudflats adjacent to marsh for foraging and this habitat type also connects the vegetated marsh patches they use and acts as something of a corridor (Gibbs et al 2009, Davis expert opinion).

Least bitterns are extremely difficult to census and their distribution and population are not well documented. Patch type Contiguous Area is selected for this species because it is able to reasonably value the habitat that is likely used by the individuals represented by the SOA.

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Land Use Land Cover Selections and Patch Type Justifications

Least Flycatcher

BIOPID 69

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved and Adjacent Undissolved	1,6
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved and Adjacent Undissolved	1,3,4,6
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	1,3,4,6
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved and Adjacent Undissolved	1,3,4,6
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved and Adjacent Undissolved	1,3,4,6
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	1,3,4,6
1800	RECREATIONAL LAND	Undissolved and Adjacent Undissolved	1,3,4,6
2100	CROPLAND AND PASTURELAND	Undissolved and Adjacent Undissolved	1,3,4,6
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	1,3,4,6
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	1,3,4,6
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Adjacent Undissolved	1,3,4,6

2400	OTHER AGRICULTURE	Undissolved and Adjacent Undissolved	<i>1,3,4,6</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4230	PLANTATION	Undissolved and Adjacent Undissolved	<i>1,2</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2,3,4,5,6</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4,5,6</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,3,4,6</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,3,4,6</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved and Adjacent Undissolved	<i>1</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved and Adjacent Undissolved	<i>1,3,4,6</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,2,3,4,6</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,2,3,4,6</i>

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,3,4,5,6</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,3,4,6</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,3,4,6</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,3,4,6</i>
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	<i>1,3,4,6</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	<i>1,3,4,6</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3,4,5,6</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3,4,6</i>

Land Use - Land Cover Selection and Patch Type Rationale

Least Flycatchers nest in semi-open, second-growth, mid-successional and mature deciduous and mixed woods with moderate understory and well-developed canopy with nests occurring in mostly deciduous small trees or saplings (Tarof and Briskie 2020). While this species is often considered to be a forest-interior bird, Least Flycatchers are often found breeding near open spaces (e.g., forest clearings, edges, yards), water (e.g., swamp, lake) and roads, including small (~1 ha) forest patches within wooded rural residential areas and parks; they occasionally breed in conifer groves, post-burned areas, swamp and bog edges, orchards, and shrubby fields (Tarof and Briskie 2020). An analysis of spatial scale showed Least Flycatchers are forest dependent and occur across a broad range of forest amounts, but preferred areas with more forest cover >4km away, shrublands and wetlands excluded, and although they can breed in residential areas, were negatively associated by urbanization with a 1-km scale of effect (Paton et al. 2019).

In New Jersey, Least Flycatchers have been observed breeding in forests near shrubby wetlands and regenerating forests (Petzinger expert opinion). Sightings reported during the breeding season on eBird.org were in large and small forest patches, and forest edges, including utility rights-of-way and urban parks (eBird.org).

Breeding territories are small, ranging from 0.01 - 0.38 ha, but breeding populations tend to cluster together with a breeding area ranging from 0.28-38.5 ha (average ranged from 1.1-18 ha; Tarof and Briskie 2020). Furthermore, fledglings will use areas within 500 meters of a nest in the first 3 weeks fledging (Tarof and Briskie 2020). Chicks are more likely to use clearcuts and wildlife openings after leaving the nest than closed-canopy mature forest (Chandler et al. 2012), and both Least Flycatcher chicks and adults were one of the more common mature-forest birds using regenerating clearcuts 2-10 years post-management during the post-fledging season (Streby et al. 2011). This suggests that breeding Least Flycatchers depend on forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Patch type Cardinal-Proximate is applied to account for the breeding population clusters and post-fledging habitat while minimizing the extent of rural and agricultural habitat types that comprise adjacent edge habitats.

Literature Citations

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5. ENSP Biologist Expert Opinion – S. Petzinger
6. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Least Tern

BIOPID 182

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Undissolved	4,*
5412	TIDAL MUD FLAT	Undissolved	4
6111	SALINE MARSHES (LOW MARSH)	Undissolved	4
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	4
6130	VEGETATED DUNE COMMUNITIES	Undissolved	2,4
7100	BEACHES	Undissolved	1-4
7300	EXTRACTIVE MINING	Undissolved	*
7400	ALTERED LANDS	Undissolved	4
7440	DISTURBED TIDAL WETLANDS	Undissolved	4
7500	TRANSITIONAL AREAS	Undissolved	4

Land Use - Land Cover Selection and Patch Type Rationale

Least terns are a colonial nesting species that nest primarily on barrier island beaches in New Jersey (Gochfeld 1983, Maclean et. al 1991, Savereno & Murphy 1995, Thompson et. al 1997). They will also nest on dredge spoil islands, occasionally on marsh islands and rarely (though consistently at active locations) at airports (Maclean et al. 1991, Thompson et al. 1997, Davis personal observation.). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Thompson et al. 1997, Davis expert opinion). They will also nest in habitats that have been converted to operations for sand mining where sandy substrate they desire for nesting becomes available (Thompson et al. 1997). Their nests are small divots in the sand, wrack in the marsh or on gravel/vegetation in more urban areas.

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. This is possible because least terns are well surveyed in the state and nest in easily delineated, discrete colonies. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option since it won't value habitats not being used by this species.

Literature Citations

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Least Tern

BIOPID 183

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1211	MILITARY RESERVATIONS	Undissolved	<i>1</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1</i>
5100	STREAMS AND CANALS	Undissolved	<i>1</i>
5200	NATURAL LAKES	Undissolved	<i>1</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1</i>
5420	DREDGED LAGOON	Undissolved	<i>1</i>
5430	ATLANTIC OCEAN	Undissolved	<i>1</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>1</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	<i>1</i>
7100	BEACHES	Undissolved	<i>1</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Least terns forage almost exclusively on fish, which they obtain by diving into open bodies of water, including the ocean, bays, inlets, lakes and rivers (Thompson et al. 1997). The land based habitat, as well as mudflats, are valued as important for foraging birds to use as a resting location between foraging forays and also as a connector between important water patches. It is also where the adults will feed the young. Although not an immediately obvious choice, the military installation classification (LULC 1211) is included because there are installations along the coast where least terns are documented nesting and foraging

Patch type Limited Extent is selected because least terns are a highly surveyed species in the state and their distribution is well understood, so a type that only values patches which intersect with the SOA is the best fit. The nesting colonies on which the foraging models are based are discrete, delineated polygons, which make it fairly easy to identify and map the areas likely to be used for foraging (given our understanding of foraging commutes). Using this patch type values the habitat that is most likely used by the associated colony without extending it to areas that are less likely to be used. One LULC was selected as "Riparian Undissolved" since it is not a habitat they will utilize unless it is adjacent to water.

Literature Citations

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* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Little Blue Heron

BIOPID 184

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	<i>2</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>2</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>2</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>1,2</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	<i>*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1,2</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1,2</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Little blue herons use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in the shrubs (such as marshelder, *Iva frutescens*) and trees (such as black cherry, *Prunus serotina*) in the Atlantic coastal marsh islands (Mccrimmon 1978, Rodgers & Smith 1995). They have also been documented nesting in phragmites (*Phragmites australis*) (Davis personal observation). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Rogers & Smith 1995).

Patch type Limited Extent is selected for this species. It is a well-surveyed species that nests in discrete colonies that are easily demarcated. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best type for this since it will not value habitats not being used by this species. Therefore this patch type, which does not dissolve LULC polygons, is the best fit for this species.

Literature Citations

1. Mccrimmon, Jr., D. A. 1978. Nest site characteristics among five species of herons on the North Carolina coast. Auk 95:267-280.
2. Rodgers, Jr., J.A. and H. T. Smith. 1995. Little Blue Heron (*Egretta caerulea*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 10 May 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/145doi:10.2173/bna.145>

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Little Blue Heron

BIOPID 185

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	3,4
5200	NATURAL LAKES	Undissolved	3,4
5300	ARTIFICIAL LAKES	Undissolved	3,4
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1-3
5411	OPEN TIDAL BAYS	Undissolved	3
5412	TIDAL MUD FLAT	Undissolved	3
5420	DREDGED LAGOON	Undissolved	3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1-3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	3,*
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	3
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	3
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	3

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	3
6240	HERBACEOUS WETLANDS	Riparian Undissolved	3
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Undissolved	*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	3
7440	DISTURBED TIDAL WETLANDS	Undissolved	3

Land Use - Land Cover Selection and Patch Type Rationale

Little blue herons forage on fish and will also take small amphibians and invertebrates. They will use open water to stalk aquatic prey in and will hunt in marshes, on mudflats and forest edges associated with wetlands for many of the other items they eat (Custer & Osborn 1978, Erwin 1983, Rodgers & Smith 1995, Willard 1977).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in easily demarcated colonies. These colonies serve as the base for the foraging model which makes it fairly easy to identify and map the areas most likely to be used for foraging around any given colony. Patch type Limited Extent allows for the habitat that is most likely used to be valued without extending to areas that are less likely to be used. There are several LULC habitat types that are only used by this species if adjacent to water. Therefore, those LULC polygons are coded "Riparian Undissolved" which will only value those habitat/classes adjacent to water thereby avoiding over valuing of habitat.

Literature Citations

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 3. Rodgers, Jr., J.A. and H. T. Smith. 1995. Little Blue Heron (*Egretta caerulea*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 10 May 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/145doi:10.2173/bna.145>
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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Loggerhead Shrike

BIOPID 70

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	3
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	3
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	3
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	3
1710	CEMETERY	Undissolved	3
1711	CEMETERY ON WETLAND	Undissolved	3
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	3
1800	RECREATIONAL LAND	Undissolved	3
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	3
2100	CROPLAND AND PASTURELAND	Undissolved	1,2,3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1,2,3
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1,2,3
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	3
2400	OTHER AGRICULTURE	Undissolved	3

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4230	PLANTATION	Undissolved	<i>1,2,3</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>3</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>3</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1,2,3</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>3</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2,3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2,3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2,3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2,3</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1,2,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
7400	ALTERED LANDS	Undissolved	<i>1</i>

7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

No empirical data exists on the migratory habitat of loggerhead shrikes, but it is considered to be similar to breeding habitat since breeding and winter habitat are very similar (Yosef 1996). Therefore, potential migratory stopover habitat includes open country with short vegetation, pastures with fence rows, old orchards, mowed roadsides, cemeteries, golf courses, agricultural fields, riparian areas, open woodlands, and abandoned railroad rights-of-way (Yosef 1996, Dechant et al. 1998). Winter habitat is also similar to breeding habitat but hay fields and idle pastures are used in addition to scrub-shrub and open forest habitat (Yosef 1996).

Loggerhead shrikes have not been documented breeding in New Jersey since the early 1900s. However, New Jersey does provide stopover habitat for migrating loggerhead shrikes, and it may differ between spring and fall (Petzinger expert opinion). Individuals may move from pastures and cropland to more shrub-forest habitat in winter, particularly when fields are snow-covered (Pruitt 2000).

Patch type Limited Extent is applied to encompass migratory stopover habitat of loggerhead shrikes while minimizing the extent of habitat valued because migrant loggerhead shrikes use stopover habitats on a limited and local basis and the stopover habitat they use is also ephemeral.

Literature Citations

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- * ENSP biologist expert opinion – S. Petzinger

Land Use Land Cover Selections and Patch Type Justifications

Long-eared Owl

BIOPID 222

REGION Statewide

PATCH TYPE Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4230	PLANTATION	Dissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent Undissolved	1
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	1

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	<i>1</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

As summarized by Marks et al. (1994): The long-eared owl inhabits dense vegetation adjacent to grasslands or shrublands; also open forests. The reports of forests as the main habitat are misleading in that long-eared owls normally use these habitats for nesting and roosting only. In Idaho, large numbers nest in willows (*Salix* spp.), cottonwoods (*Populus* spp.), and junipers (*Juniperus* spp.) adjacent to shrubsteppe desert. Nesting in dense or brushy vegetation amidst open habitats also occurs in western states from California to Nevada to South Dakota. This owl inhabits coniferous or deciduous forest near open meadows in Michigan and western Oregon. In northeastern Oregon, breeds in extensive stands of grand fir (*Abies grandis*) mixed with other conifers, but forages primarily in open forests and forest edges.

Patch type Cardinal Proximate is used to identify cardinal (i.e., all forest types) that intersect the SOA, plus adjacent agricultural and shrubby types that long-eared owls use for foraging. This patch type most closely represents the way this species seems to select habitats in the landscape.

Literature Citations

1. Marks, J. S., D. L. Evans and D. W. Holt. 1994. Long-eared Owl (*Asio otus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/133> [doi:10.2173/bna.133](https://doi.org/10.2173/bna.133)

Land Use Land Cover Selections and Patch Type Justifications

Long-eared Owl

BIOPID 223

REGION Statewide

PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4230	PLANTATION	Dissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	1
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

The long-eared owl uses conifer stands for roosting in eastern U.S.; the important attribute of winter roosts seems to be dense vegetation for concealment and perhaps thermal cover (Marks et al. 1994). Roost groves are adjacent to open habitats used for foraging (Marks et al. 1994). However, only forest habitat types were selected for valuation for roosts.

Patch type Contiguous Area is applied to dissolve all the suitable LULC polygons into patches, then value those patches that intersect a long-eared owl species occurrence area (SOA). In this way, suitable habitats (only forest types) were linked before being segregated by roads or unsuitable habitat types. This patch type served to identify the whole forest patch associated with a roosting SOA.

Literature Citations

1. Marks, J. S., D. L. Evans and D. W. Holt. 1994. Long-eared Owl (*Asio otus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/133> [doi:10.2173/bna.133](https://doi.org/10.2173/bna.133)

Land Use Land Cover Selections and Patch Type Justifications

Migratory Raptor Concentration Site *BIOPID* 241 *REGION* Statewide *PATCH TYPE* Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	2,3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	2,3
1710	CEMETERY	Undissolved	2,3
1711	CEMETERY ON WETLAND	Undissolved	2,3
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	3
1800	RECREATIONAL LAND	Undissolved	3
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	3
2100	CROPLAND AND PASTURELAND	Undissolved	3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	3
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	3
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	3
2400	OTHER AGRICULTURE	Undissolved	3
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	2,3

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	2,3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	2,3
4230	PLANTATION	Undissolved	2,3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	2,3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	2,3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	2,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	2,3
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	2,3
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	2,3
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	2,3
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2,3
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2,3
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	2,3
5412	TIDAL MUD FLAT	Undissolved	2,3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2,3
6120	FRESHWATER TIDAL MARSHES	Undissolved	2,3
6130	VEGETATED DUNE COMMUNITIES	Undissolved	2,3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	2,3

6210	DECIDUOUS WOODED WETLANDS	Undissolved	2,3
6220	CONIFEROUS WOODED WETLANDS	Undissolved	2,3
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	2,3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	2,3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	2,3
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	2,3
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	2,3
6240	HERBACEOUS WETLANDS	Undissolved	2,3
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	2,3
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	2,3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	2,3
6500	SEVERE BURNED WETLANDS	Undissolved	2,3
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	2,3
7300	EXTRACTIVE MINING	Undissolved	2,3
7400	ALTERED LANDS	Undissolved	2,3
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	2,3
7440	DISTURBED TIDAL WETLANDS	Undissolved	2,3
7500	TRANSITIONAL AREAS	Undissolved	2,3

Land Use - Land Cover Selection and Patch Type Rationale

All LULC types that provide some sort of vegetative habitat in the lower 20 kilometers of the Cape May peninsula were valued for migrating birds, because studies have shown that southbound migrating birds use all types of terrestrial habitats available before the approach to the Delaware Bay water crossing (McCann et al. 1993; Niles et al. 1996; Frank 2007).

Patch type Limited Extent is used to value all vegetated habitats in the area identified as terrestrial migratory bird habitat, the lower 20 km of the southern point of Cape May peninsula.

Literature Citations

1. Frank, CA. 2007. A comparison study of migratory raptor distribution and habitat use at the Cape May peninsula stopover. M.S. Thesis, Rutgers University, New Brunswick. 87 pp.
2. McCann, J. M., S. E. Mabey, L. J. Niles, C. Bartlett, and P. Kerlinger. 1993. A regional study of coastal migratory stopover habitat for Neotropical migrant songbirds: Land management implications. Trans. N. Amer. Wildlife and Natural Resources Conf. 58:398-407.
3. Niles, L.J., J. Burger, and K. E. Clark. 1996. The influence of weather, geography, and habitat on migrating raptors on Cape May peninsula. Condor 98:382-394.

Land Use Land Cover Selections and Patch Type Justifications

Nashville Warbler

BIOPID 71

REGION Statewide

PATCH TYPE Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1,2
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1,2
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1,2
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1,2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1,2
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1,2
4230	PLANTATION	Adjacent Undissolved	1,2
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1,2
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1,2
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1,2
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1,2
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1,2
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1,2

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1,2
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1,2
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1,2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1,2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1,2
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	1,2
6240	HERBACEOUS WETLANDS	Adjacent Undissolved	1,2
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	1,2
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	1,2

Land Use - Land Cover Selection and Patch Type Rationale

Nashville warblers breed in second growth, open deciduous or mixed forests with high levels of light penetration, preferably with shrubby undergrowth, forest edges, and regenerating fields (Williams 1996, Lowther & Williams 2011). In New York they nest in mixed forests, forest edges, and fields, along streams or at edge of a pond, marsh, swamp, or bog, and on mountain slopes (Williams 1996, Lowther & Williams 2011). Nashville warblers will also nest in tamarack and spruce-bordered bogs with sphagnum and Labrador tea. The area immediately around the nest is usually open rather than heavily wooded areas with herbaceous ground cover (Lowther & Williams 2011). In the East this species can inhabit steep mountain slopes as high as 1,400 m, but not above timberline (Williams 1996).

Patch type Cardinal-Proximate is applied because Nashville warblers breed in open forest, forest edge, and scrub-shrub. The cardinal habitats are dissolved and most likely to be breeding habitat for Nashville warblers either by themselves or as a conglomerate: open forests, shrubby habitats, and wetland forests. Proximate habitats are only likely be used only when adjacent to cardinal habitat and are undissolved: upland forest with >50% cover and herbaceous wetlands.

Literature Citations

1. Lowther, P. and J. M. Williams. 2011. Nashville Warbler (*Oreothlypis ruficapilla*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/205> [doi:10.2173/bna.205](https://doi.org/10.2173/bna.205)
2. Williams, J. M. 1996. Nashville Warbler (*Vermivora ruficapilla*). In The Birds of North America, No. 205 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Land Use Land Cover Selections and Patch Type Justifications

Northern Goshawk

BIOPID 41

REGION Statewide

PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1
4230	PLANTATION	Dissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	1
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

From Squires and Reynolds (1997): In eastern deciduous forests, Northern goshawks prefer nesting in mature, mixed hardwood–hemlock stands of birch (*Betula* sp.), beech (*Fagus* sp.), maple (*Acer* sp.), and eastern hemlock (*Tsuga canadensis*). Forest stands containing nests are often small, approximately 10–100 ha, and territories may contain 1– 5 alternative nest areas. Depending on the continuity of forest cover, nests of adjacent pairs occur at regular intervals. Descriptions of nest habitat may be biased because not all studies equally sample all habitats and forest successional stages for nesting hawks; the data are equivocal regarding mature forest preferences. Although goshawks are considered habitat generalists at large spatial scales, they tend to nest in a relatively narrow range of vegetation structural conditions. Nests are typically in mature to old-growth forests composed primarily of large trees, with high (60–90%) canopy closure, near the bottom of moderate hill slopes, with sparse ground cover. Closed stands may reduce predation and, along with north slopes, provide relatively cool environments. Nest habitat is single to multistoried, depending on the forest type. In eastern deciduous forests, goshawks prefer to nest in large forested areas containing more mature timber than is generally present in the landscape while smaller forest tracts are seldom used.

In the non-breeding season, mature forests may provide sufficient cover to attain undetected hunting perches, yet are open enough for hawks to maneuver when hunting prey. Agricultural lands, wetlands, and clear-cuts are used in proportion to their availability. Although mature forests were preferred by goshawks wintering in Swedish boreal forests, edge habitats were used extensively by birds wintering in agricultural lands (Squires and Reynolds 1997).

The Contiguous Area patch type is applied to represent suitable and contiguous forest areas used by this species, recognizing it has a large territory size relative to other forest hawks.

Literature Citations

1. Squires, John R. and Richard T. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/298>
[doi:10.2173/bna.298](https://doi.org/10.2173/bna.298)

Land Use Land Cover Selections and Patch Type Justifications

Northern Harrier

BIOPID 224

REGION Statewide

PATCH TYPE Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
2100	CROPLAND AND PASTURELAND	Dissolved	1-5
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	2-5
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	2-4
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	2-5
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent Undissolved	3
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	2-5
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Adjacent Undissolved	2,3
5412	TIDAL MUD FLAT	Dissolved	2,4
6111	SALINE MARSHES (LOW MARSH)	Dissolved	2,4
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2,4
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	3,4
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	3,4
6240	HERBACEOUS WETLANDS	Dissolved	2-4
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	3

7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	2-5
7440	DISTURBED TIDAL WETLANDS	Dissolved	2,4

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agricultural areas, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008).

Northern harriers are considered open field raptors and are associated with agricultural lands, marshes, scrub-shrub, pastures and wetlands with tall dense vegetation (Denchant et al. 2002). Northern harriers are ground nesters and they typically place their nests in grasslands or wetlands in dense vegetation (Macwhirter et al. 1996, Denchant et al. 2001, Blake et al. 2008). These birds prefer to place their nests in the wetter margins of their breeding habitat, probably to reduce the risk of predation (Denchant et al. 2002, Macwhirter et al. 1996). In the coastal states such as New Jersey, Northern harriers are found breeding in fresh and tidal marshes as well as upland meadows and grasslands (Macwhirter et al. 1996, Blake et al. 2008). Non-breeding habitat is the same as breeding (Macwhirter et al. 1996).

Patch Type Cardinal-Proximate is selected for Northern harriers since they are relatively mobile, reflecting the ephemeral nature of their preferred breeding habitats and the need to follow prey sources and habitat changes (Macwhirter et al. 1996, Denchant et al. 2002, Blake et al. 2008). Patch Type Cardinal-Proximate dissolves the cardinal polygons and values adjacent (proximate) LULC classes to form large, contiguous patches of suitable habitat for breeding and non-breeding Northern harriers (Macwhirter et al. 1996, Denchant et al. 2002). Adjacent (proximate) habitat is only valued if adjacent to primary habitat. This approach limits the habitat valued to that which the population uses but accommodates its need for breeding and foraging habitat.

Literature Citations

1. Askins, R. A. 2002. Restoring North America's birds: lessons from landscape ecology. Yale University Press, New Haven, Connecticut, USA.
2. Blake, M., R. Bowen, C. Griffin and K. McGarigal. 2008. A classification-tree analysis of nesting habitat in an island population of Northern harriers. *The Condor*. 110(1): 177-183.
3. Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, M. P. Nenneman, and B. R. Euliss. 1998 (revised 2002). Effects of management practices on grassland birds: Northern Harrier. Northern Prairie Wildlife Research Center, Jamestown, ND. 15 pages.
4. Macwhirter, R. Bruce and Keith L. Bildstein. 1996. Northern Harrier (*Circus cyaneus*), *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/210doi:10.2173/bna.210>

5. Morgan, M. and M. Burger. 2008. A Plan for Conserving Grassland Birds in New York: Final Report to the New York State Department of Environmental Conservation under contract #C005137. New York Audubon. 140 pp.

Land Use Land Cover Selections and Patch Type Justifications

Olive-sided Flycatcher

BIOPID 344

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	<i>1,2,3</i>
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	<i>1,2,3</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>3</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>3</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1,3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1,3</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1,3</i>
1800	RECREATIONAL LAND	Undissolved	<i>1,3</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1,2,3</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4230	PLANTATION	Undissolved	<i>1,2,3</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>

4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1,2,3</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1,2,3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2,3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2,3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2,3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Olive-sided Flycatchers are typically associated with forest openings, forest edges, and open-canopy forests (<40% canopy cover) containing snags or residual trees which include forested riparian areas, forested wetlands and lake edges, post-burned forests, and clearcuts, though this species uses a greater diversity of habitats, particularly riparian and non-coniferous habitats, during migration (Altman and Sallabanks 2020).

In New Jersey, Olive-sided Flycatchers have been observed in regenerating forests after seed tree silvicultural prescriptions as well as wetlands adjacent to forest (Petzinger expert opinion). Migrants have also been reported in powerlines, urban parks, cemeteries, and wooded residential areas (eBird).

Patch type Limited Extent is applied to encompass migratory stopover habitat of olive-sided flycatchers while minimizing the extent of habitat valued, particularly within urban areas.

Literature Citations

1. Altman, B. and R. Sallabanks (2020). Olive-sided Flycatcher (*Contopus cooperi*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.olsfly.01>
2. ENSP Biologist expert opinion – S. Petzinger
3. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Peregrine Falcon

BIOPID 239

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Riparian Undissolved	3,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Riparian Undissolved	3,*
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	3,*
5411	OPEN TIDAL BAYS	Undissolved	3,*
5412	TIDAL MUD FLAT	Undissolved	3,*
6111	SALINE MARSHES (LOW MARSH)	Undissolved	3,*
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	3,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	3,*
6130	VEGETATED DUNE COMMUNITIES	Undissolved	3,*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	3,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	3,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	3,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	3,*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	3,*
6240	HERBACEOUS WETLANDS	Undissolved	3,*

7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	3,*
7440	DISTURBED TIDAL WETLANDS	Undissolved	3,*

Land Use - Land Cover Selection and Patch Type Rationale

All emergent and scrub-shrub wetland habitats within 1 km of a nest were designated as critical habitat. Home range size is much larger than 1 km, as peregrines forage on birds found in open habitats within 5 km of the nest (White et al. 2002). Peregrines will defend an area that is approximately 1.6 km in radius, based on the closest nesting pairs observed in NJ (Clark expert opinion). Prey species are mainly passerines, shorebirds and doves found in open habitats, usually within 1-5 km of the nest, and typical hunting habitats are emergent marsh, scrub-shrub, wooded edges, beach, dunes and intertidal flats (White et al. 2002). In urban areas, any of those habitat types are used, in addition to the urban setting itself, where peregrines hunt rock pigeons (*Columba livia*). In urban areas, *Columba* species may comprise 31% of the peregrine diet, and resident bird species (including *Columba* species) more than 90% (by occurrence; Nadeski 2001). In contrast, Steidl et al. (1997) found that nearly 70% of the diet of NJ coastal peregrines consisted of migratory birds, predominantly shorebirds. These diet figures point to the habitat differences between coastal/marsh nesting peregrines and urban-nesting peregrines.

Patch type Limited Extent was selected to emphasize the valuation of suitable habitat types closest to the nest site proper, but contiguous patches of suitable habitat would typically be used beyond the 1 km SOA radius due to the birds' territory size and foraging habits. Urban habitats were not selected to be valued unless they were riparian, but ENSP recognizes that urban peregrines make use of a wide range of habitats available to them.

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* ENSP biologist expert opinion – K. Clark

Land Use Land Cover Selections and Patch Type Justifications

Pied-billed Grebe

BIOPID 186

REGION Statewide

PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1
5100	STREAMS AND CANALS	Dissolved	1
5200	NATURAL LAKES	Dissolved	1
5300	ARTIFICIAL LAKES	Dissolved	1
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Dissolved	1
6111	SALINE MARSHES (LOW MARSH)	Dissolved	1
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	1
6120	FRESHWATER TIDAL MARSHES	Dissolved	1
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Dissolved	*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Dissolved	*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Dissolved	*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Dissolved	*
6240	HERBACEOUS WETLANDS	Dissolved	1

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Dissolved	*
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Pied-billed grebes use open water habitat in lakes, bays and rivers for foraging, where they will dive into the water to consume prey items such as fish, aquatic insects and crustaceans. They will also use the areas close to shore for cover and to hunt other prey items. They will nest in the herbaceous wetlands around and near the bodies of water they hunt in, raising a brood of precocious chicks. Once the chicks are old enough, they will follow the adults onto the open water and utilize these habitats as well (Muller and Storer 1999). Although they do not directly use mudflats, this habitat type connects the vegetated marsh patches and open water they do use and acts as something of a corridor (Muller & Storer 1999, C. Davis expert opinion).

Patch type Contiguous Area was selected because it dissolves the LULC types the species is known to use into one patch and values the resulting habitat patch intersected by the SOA. Pied-billed grebes are not a well documented species in the state, due both to their secretive nature and presumed small numbers. Database records are generally not comprehensive enough to fully map their home ranges so this patch type ensures that all the suitable habitat in and around the SOA will be valued. Upland LULC types are typically used only when associated with water, hence their dissolve type of "Riparian Dependent."

Literature Citations

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[doi:10.2173/bna.410](https://doi.org/10.2173/bna.410)

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Piping Plover

BIOPID 187

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5412	TIDAL MUD FLAT	Undissolved	<i>2</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1-4</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>1-4</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>1,2</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-4</i>
7100	BEACHES	Undissolved	<i>1-4</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Piping plovers are small shorebirds that have firm habitat requirements. In New Jersey, they are almost exclusively found on Atlantic coast beaches and mudflats, with few known exceptions. Each breeding pair will delineate a territory in the area between the dune and high tide line and use the sandy substrate to nest (Elliott-Smith and Haig 2004). Piping plovers primarily forage for various invertebrates in the wrack line (the line of debris deposited by the ocean as the tide rises), dune line and in the intertidal zone. However they will also use wetland edges, marsh island edges and mudflats to forage. Their precocial chicks will join the adults to forage almost from the time they are hatched. Chicks will remain in these habitats until they fledge and migrate (Loefering and Fraser 1995, Regosin 1998).

Patch type Limited Extent is selected for this species. Due to their status as a federal and state listed species, piping plovers are the recipients of the highest level of survey effort and their distribution in the state is very well understood. Their proclivity for nesting in open areas makes it relatively easy to determine and map their home ranges. Patch type Limited Extent assures that only the habitat that the individuals represented by the SOA are valued without including areas that are not used by those individuals since it only values habitat that intersect with the SOA.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Prairie Warbler

BIOPID 345

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1,2,3
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved and Adjacent Undissolved	1,2,3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1,2,3
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	1,2,3
1800	RECREATIONAL LAND	Undissolved and Adjacent Undissolved	1,2,3
2100	CROPLAND AND PASTURELAND	Undissolved and Adjacent Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	1
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1,2,3
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Adjacent Undissolved	1
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,3

4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1</i>
4230	PLANTATION	Adjacent Undissolved	<i>1</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2,3</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>1</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3</i>

6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Prairie warblers breed in a variety of shrubby habitats lacking closed canopies including pine forests with scattered trees, forest glades, clearcuts, shrubby dunes, pine and scrub oak barrens, abandoned fields, pastures, and orchards with shrubby growth, regenerating forest, forest-field edges, powerlines, Christmas tree farms, and reclaimed mines becoming shrubby (Nolan et al. 2020).

In New Jersey, Prairie Warblers are commonly found breeding in powerline rights-of-way, scrub barrens, shrubby wetlands, and regenerating open-canopy forests after seed tree silvicultural prescriptions (Petzinger expert opinion). Prairie Warblers are somewhat area sensitive (Nolan et al. 2020) and only reported breeding near residential areas when other habitat, such as parks, fields, shrublands, powerlines, or wetlands are present (eBird).

Although Prairie Warblers do not use urban areas while breeding, LULC 1700 (Other urban or built up land) was included as habitat because some habitat types, including grasslands and regenerating forest stands, have been misclassified as this LULC.

Because Prairie Warblers use field/shrub-forest edge habitat but not closed-canopy upland forests, the Cardinal-Proximate patch type was chosen as the best representation to depict suitable habitat. Early-successional habitat, open forest, and shrubby areas were chosen as cardinal habitats and dissolved except for a few categories (upland rights-of-way (developed), agriculture, orchards, wooded and disturbed wetlands). Those exceptions can be suitable habitat but tend to expand over large areas; therefore, these LULCs were chosen to be undissolved and adjacent undissolved to reduce the connectivity of this habitat type. Closed-canopy forest by itself is not suitable habitat but is suitable when adjacent to primary habitat types, and occasionally regenerating forests with 30% canopy cover have been misclassified as forests with >50% canopy cover. Again, this LULC group was chosen to not be dissolved because it tends to expand over large areas.

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2. ENSP Biologist expert opinion – S. Petzinger
3. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Red Knot

BIOPID 214

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>3,*</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1-3,5,7</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>1-3,5,7</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>3,*</i>
7100	BEACHES	Undissolved	<i>1-3,5,7</i>

Land Use - Land Cover Selection and Patch Type Rationale

During spring migration, red knots forage on horseshoe crab eggs on Delaware Bay beaches and creek-mouth areas, and on bivalves and polychaetes on Atlantic coast beaches, intertidal areas, and impoundments (Burger et al. 1997, Clark et al. 1993, Karpanty et al. 2006, Niles et al. 2008). Highest feeding densities are most often associated with prey densities that are seasonally abundant or abundant but patchily distributed spatially and temporally (Burger et al. 1997, Clark et al. 1993, Karpanty et al. 2006, Niles et al. 2008). During fall migration, red knot suitable foraging habitats include Atlantic coast beach, tidal marsh, and intertidal marsh and mudflat (Burger et al. 1997, Clark et al. 1993, Karpanty et al. 2006, Niles et al. 2008). Red knot movements are mostly driven by tidal cycles between low-tide foraging areas and high-tide roost sites (Burger et al. 1997, Clark et al. 1993, Karpanty et al. 2006, Niles et al. 2008). As red knots spend more than half of the year on migratory stopovers along the US East Coast and wintering areas in the US, Central and South America, protection of a network of essential sites is critical for annual survival and population stability.

Shorebird usage is limited to very specific habitats, and due to the level of survey effort in New Jersey, a great deal is known about these habitats. Patch type Limited Extent is applied because none of the LULC polygons are dissolved, and is consequently the most conservative patch type selection. A 100 m buffer was applied to all species occurrences to account for the dynamic accretion and deposition within the coastal community ecotone.

Literature Citations

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* ENSP biologist expert opinion - W. Pitts and A. Dey

Land Use Land Cover Selections and Patch Type Justifications

Red-headed Woodpecker

BIOPID 73

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	1,2,3
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1,2
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,2
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1,2
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,2
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	1,2
1710	CEMETERY	Undissolved	1,2
1711	CEMETERY ON WETLAND	Undissolved	1,2
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	1,2
1800	RECREATIONAL LAND	Undissolved	1,2,3
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1,2
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	1,2,3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1,2
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1,2

2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1,2
2400	OTHER AGRICULTURE	Adjacent Undissolved	1,2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1,2,3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1,2,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,3
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent Undissolved	1,2,3
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1,2
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	1,2
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1,2,3
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1,2,3
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1,2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2,3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,2,3
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2,3

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2,3</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3</i>
7400	ALTERED LANDS	Adjacent Undissolved	<i>1,2</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1,2</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Red-headed Woodpeckers can be found in a variety of habitats that contain trees, especially where there are dead trees or limbs and open canopies, including deciduous woodlands, pine and mixed pine forests, lowland and upland habitats, river bottoms, open woods, groves of dead and dying trees, orchards, parks, open agricultural country and pastures, savanna-like grasslands with scattered trees, golf courses, forest edge, along roadsides, isolated small forest patches, beaver wetlands, and occasionally in urban areas (Frei et al. 2020). Breeding habitat preferences include open woodlands with large, tall trees, high basal area, low understory density, and high density of snags, dead limbs, and mast trees, but only if the canopy is open or contains canopy openings; density of breeding pairs are higher in savannas and open woodlands compared to open or shrubby areas and closed-canopy forests and habitat use is positively correlated with fire (Frei et al. 2020).

In New Jersey, breeding Red-headed Woodpeckers were also observed in young regenerating forests (0-3 years post-management) that contained scattered trees and snags as well as golf courses and wooded backyards (Petzinger expert opinion). Sightings reported on eBird.org during the breeding season include beaver wetlands, forests and forest edges, golf courses, forest-agricultural edges, and wooded backyards (eBird.org).

Patch type Cardinal-Proximate is chosen to limit how the different habitat types are dissolved and valued to increase the likelihood that the valued patches are suitable for breeding red-headed woodpeckers and actually support the documented local population. Because these woodpeckers primarily breed in open forest and wetland forests, those LULC types are the most likely to be used by breeding individuals and so are cardinal habitat types that are dissolved. Red-headed woodpeckers can also use forest edges, cemeteries, golf courses, and shrub wetlands, so those LULC types are treated as cardinal habitat but are undissolved to limit the amount of closed-canopy forest valued. The open habitats associated with forest edge were chosen as proximate undissolved habitat so they would only be valued when they are the most likely to be part of the local habitat, which is when adjacent to cardinal habitats. Finally, red-headed woodpeckers also breed in residential areas. This habitat class, in addition to rights-of-way, were undissolved and will only be valued when they intersect the SOA to limit the amount of residential habitat valued.

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2. ENSP Biologist Expert Opinion – S. Petzinger
3. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Red-headed Woodpecker

BIOPID 74

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	Undissolved	<i>1,2,3</i>
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	<i>1,2,3</i>
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	<i>1,2,3</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1,2</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1,2</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1,2</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1,2</i>
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	<i>1,2</i>
1710	CEMETERY	Dissolved	<i>1,2</i>
1711	CEMETERY ON WETLAND	Dissolved	<i>1,2</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	<i>1,2</i>
1800	RECREATIONAL LAND	Dissolved	<i>1,2,3</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	<i>1,2</i>
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	<i>1,2,3</i>

2140	AGRICULTURAL WETLANDS (MODIFIED)	Adjacent Undissolved	1,2
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Adjacent Undissolved	1,2
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1,2
2400	OTHER AGRICULTURE	Adjacent Undissolved	1,2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1,2,3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1,2,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,3
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent Undissolved	1,2,3
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1,2
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	1,2,3
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1,2,3
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1,2,3
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1,2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2,3

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2,3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2,3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2,3</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3</i>
7400	ALTERED LANDS	Adjacent Undissolved	<i>1,2</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1,2,3</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

There is little information on red-headed woodpecker habitat use during migration but tend to be found where mature oak and/or fruit trees are abundant, including forest edges (Frei et al. 2020). In the winter Red-headed Woodpeckers can be found in mature forest, particularly oak, oak-hickory, maple, ash, beech, and pine or pine-oak. They also prefer areas with standing snags such as beaver ponds, marshes, and swamps as well as forested areas that had succumbed to disease or pests (Frei et al. 2020). The presence of acorns is an important factor in determining winter distribution of red-headed woodpeckers, though they may also feed on corn kernels (Frei et al. 2020).

In New Jersey, migrating or wintering Red-headed Woodpeckers were also observed in urban parks, golf courses and wooded backyards (Petzinger expert opinion). Sightings reported on eBird.org during the non-breeding season also include marshes/wetlands, forests and forest edges, golf courses, forest-agricultural edges, and backyard feeders (eBird.org)

Patch type Cardinal-Proximate was used for red-headed woodpeckers. This approach was used because, while red-headed woodpeckers can use a variety of different habitats during the non-breeding season, we sought to limit how the different habitat types are dissolved and valued to increase the likelihood that the valued patches are suitable for non-breeding red-headed woodpeckers. Because these woodpeckers primarily use open forest and wetland forests for migration and wintering, those LULC types are the most likely to be used by non-breeding individuals and so are cardinal habitat types that are dissolved. Red-headed woodpeckers are also known to use forest edges and golf courses, so those LULC types are treated as cardinal habitat but are undissolved to limit the amount of closed-canopy forest valued. The open habitats associated with forest edge were chosen as proximate undissolved habitat so they would only be valued when they are the most likely to be part of the local habitat, which is when adjacent to cardinal habitats. Finally, non-breeding red-headed woodpeckers will use residential areas more often than in the breeding season. Even so, these habitat classes, in addition to rights-of-way, were undissolved and will only be valued when they intersect the SOA to limit the amount of residential habitat valued.

Literature Citations

1. Frei, B., K. G. Smith, J. H. Withgott, P. G. Rodewald, P. Pyle, and M. A. Patten (2020). Red-headed Woodpecker (*Melanerpes erythrocephalus*), version 1.0. In Birds of the World (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.rehwoo.01>
2. ENSP Biologist Expert Opinion – S. Petzinger
3. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Red-shouldered Hawk

BIOPID 204

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,3
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-3
4230	PLANTATION	Undissolved	1,3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-3
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1-3
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,3
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1,3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,3

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

For eastern populations of red-shouldered hawks, habitat varies from bottomland hardwood, riparian areas, and flooded deciduous swamps to upland mixed deciduous-coniferous forest. Generally, habitat is extensive forest stands consisting of mature to old-growth canopy trees with variable amounts of understory (Dykstra et al. 2008). This is consistent with Liguori's (2003) characterization for NJ of mature wet woods.

From Dykstra et al. 2008: This species is fairly common in suburban areas adjacent to forested habitat in the northern half of eastern North America and common in suburban areas with the appropriate habitat in southeastern United States. In Ontario, this species favors mature, open, deciduous forest with low ground cover. Red-shouldered hawks in Georgia nested in areas containing more mature bottomland hardwood and less agricultural habitat than red-tailed hawks, and nests were closer to water and farther from edges and openings than those of red-tailed hawks. In Indiana, red-shouldered hawk nest sites were more associated with wetlands and forested areas and were farther from human development than those of red-tailed hawks. Habitat selection is not fixed across the red-shouldered hawk's range; there is documentation of them adapting their habitat usage to what is available. In NJ however, red-shouldered hawks are clearly associated with forests and forested wetlands (ENSP 2011).

The Limited Extent patch type is selected to value only the forest habitat classes, and the wetland shrub habitats adjacent to the valued forest parcels, within and proximate to known species' occurrences.

Literature Citations

1. Dykstra, Cheryl R., Jeffrey L. Hays and Scott T. Crocoll. 2008. Red-shouldered Hawk (*Buteo lineatus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/107doi:10.2173/bna.107>
2. ENSP. 2011. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
3. Liguori, S. 2003. Red-shouldered Hawk (*Buteo lineatus*). In *Endangered and Threatened Wildlife of New Jersey* (B. Beans and L. Niles, eds.). Rutgers University Press, New Brunswick, New Jersey. Pp 61-67.

Land Use Land Cover Selections and Patch Type Justifications

Roseate Tern

BIOPID 188

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,2
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1
6240	HERBACEOUS WETLANDS	Undissolved	1
7100	BEACHES	Undissolved	1
7440	DISTURBED TIDAL WETLANDS	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Roseate terns are a colonial species that utilizes coastal habitats for nesting. In New Jersey, they can nest on sandy substrates of beaches and on wrack in marsh wetlands (though they will use additional habitats, such as rocky shores, which are not available to them in NJ) and will use mudflats for roosting (Gochfeld et al. 1998, Nisbet 1981).

Patch type Limited Extent is selected because it represents all habitat used by the individuals that make up a particular SOA by only valuing patches that intersect with that SOA (versus creating contiguous patches). This creates a realistic depiction of the colonies habitat needs and eliminates the chance of overvaluing areas not important to the breeding birds. Although roseate terns are infrequent nesters in the state, the habitats they would occur in are surveyed regularly and colonies are easily delineated when observed. It is therefore satisfactory to capture the breeding birds' habitat without overvaluing areas of the state. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only identify habitats valued by this species.

Literature Citations

1. Gochfeld, M., J.Burger and I.C. Nisbet. 1998. Roseate Tern (*Sterna dougallii*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved 24 May 2010 from the Birds of North America Online: <http://bna.birds.cornell.edu/bna/species/370> [doi:10.2173/bna.370](https://doi.org/10.2173/bna.370)
2. Nisbet, I. C. T. 1981. Biological characteristics of the Roseate Tern (*Sterna dougallii*). Report 50181-084-9. U.S. Fish Wildlife Service, Newton Corner, MA.

Land Use Land Cover Selections and Patch Type Justifications

Roseate Tern

BIOPID 189

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5100	STREAMS AND CANALS	Undissolved	*
5200	NATURAL LAKES	Undissolved	*
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1-4</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1-4</i>
5420	DREDGED LAGOON	Undissolved	*
5430	ATLANTIC OCEAN	Undissolved	<i>1</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	*
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	*
6130	VEGETATED DUNE COMMUNITIES	Undissolved	*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	*
6240	HERBACEOUS WETLANDS	Undissolved	*

Land Use - Land Cover Selection and Patch Type Rationale

Roseate terns primarily forage on marine fish. They forage over open bodies of water such as tidal bays, inlets, lakes, rivers and the ocean (Heinemann 1992, Safina 1990, Safina 1990, Shealer & Burger 1993). The land based habitat that is valued is important for foraging birds to use as a resting location between foraging forays and also as a connector between important water patches. It is also where the adults will feed the young.

Roseate terns are very infrequent nesters in this state. However, the nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Patch type Limited Extent allows for the habitat that is most likely used to be by the associated colony (which is based on our understanding of foraging commutes) to be valued without extending it to areas that are less likely to be used.

Literature Citations

1. Heinemann, D. 1992. Foraging ecology of Roseate Terns on Bird Island, Buzzards Bay, Massachusetts. Unpublished Report to U.S. Fish and Wildlife Service, Newton Corner, MA.
 2. Safina, C. 1990. Bluefish mediation of foraging competition between Roseate and Common Terns. Ecology 71:1804-1809.
 3. Safina, C. 1990. Foraging habitat partitioning in Roseate and Common Terns. Auk 107:351-358.
 4. Shealer, D. A. and J. Burger. 1993. Effects of interference competition on the foraging activity of tropical Roseate Terns. Condor 95:322-329.
- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Rose-breasted Grosbeak **BIOPID** 347 **REGION** Statewide **PATCH TYPE** LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1
1800	RECREATIONAL LAND	Undissolved	1
2100	CROPLAND AND PASTURELAND	Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4230	PLANTATION	Undissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1
6240	HERBACEOUS WETLANDS	Undissolved	1
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	1
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1

6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
6500	SEVERE BURNED WETLANDS	Undissolved	<i>1</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Rose-breasted Grosbeaks nest in saplings, shrubs, and vines within open-canopy forests and woodlands as well as pastures, overgrown fields, rights-of-way, residential areas, gardens, and suburban parks. They are also found breeding along forest edges, shrubby ecotones, orchards, and in wetlands.

Because rose-breasted grosbeaks are not area-sensitive and breed in a variety of habitats, including residential areas, the Limited Extent patch type was chosen to minimize the extent of habitat valued.

Literature Citations

1. Wyatt, V. E. and C. M. Francis (2020). Rose-breasted Grosbeak (*Pheucticus ludovicianus*), version 1.0. In Birds of the World (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.robgro.01>

Land Use Land Cover Selections and Patch Type Justifications

Ruddy Turnstone

BIOPID 328

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5200	NATURAL LAKES	Undissolved	<i>1,2,3</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1,2,3</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1,2,3</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1,2,3</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>1,2,3</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>1,2,3</i>
7100	BEACHES	Undissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

During spring migration, several shorebird species, including Ruddy Turnstones, forage on horseshoe crab eggs and bivalves on Delaware Bay beaches and creek-mouth areas. Turnstones and Red knots also forage on bivalves and polychaetes on Atlantic coast beaches, intertidal areas, and impoundments (Burger et al. 1997, Clark et al. 1993, Robinson et al. 2003). Highest feeding densities are most often associated with prey densities that are seasonally abundant, or abundant but patchily distributed spatially and temporally (Burger et al. 1997, Clark et al. 1993, Robinson et al. 2003).

Shorebird usage is limited to very specific habitats, and due to the level of survey effort in New Jersey, a great deal is known about these habitats. Patch Type LE.1 Limited Extent was chosen because none of the LU/LCs are dissolved, and is consequently the most conservative patch type selection. A 100 m buffer was applied to all species occurrences to account for the dynamic accretion and deposition within the coastal community ecotone.

Literature Citations

1. Burger, J., L. Niles, and K. E. Clark. 1997. Importance of beach, mudflat, and marsh habitats to migrant shorebirds on Delaware Bay. *Biological Conservation* 79:283-292.
2. Clark, K. E., L. J. Niles, and J. Burger. 1993. Abundance and distribution of migratory shorebirds in Delaware Bay, NJ. *Condor* 95:694-705.
3. Robinson, R. A., Atkinson, P. W., and Clark, N. A. 2003. Arrival and weight gain of Red knots *Calidris canutus*, Ruddy turnstone *Arenaria interpres* and Sanderling *Calidris alba* staging in Delaware Bay in spring. 307. British Trust for Ornithology.

Land Use Land Cover Selections and Patch Type Justifications

Rusty Blackbird

BIOPID 349

REGION Statewide

PATCH TYPE LE.1 Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1</i>

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Rusty Blackbirds typically spend the winter in wetlands, including swamps, forested wetlands, and edges of open water and adjacent fields and thickets. Migrants often roost in wooded areas and occasionally on the ground in fields. During the non-breeding season they forage in agricultural lands, including pastures, stubble and plowed fields, as well as along edges of open water and wetlands and areas with pine seeds, fruits, and berries.

Because Rusty Blackbirds tend to have nomadic behavior during the non-breeding season, the Limited Extent patch type was chosen to minimize the amount of habitat valued by occurrences.

Literature Citations

1. Avery, M. L. (2020). Rusty Blackbird (*Euphagus carolinus*), version 1.0. In Birds of the World (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bow.rusbla.01>

Land Use Land Cover Selections and Patch Type Justifications

Saltmarsh Sparrow

BIOPID 75

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved and Adjacent Undissolved	4
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	1,2,4
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	4
1800	RECREATIONAL LAND	Undissolved and Adjacent Undissolved	4
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved and Adjacent Undissolved	4
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	1,2,4
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved and Adjacent Undissolved	1,2,4
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved and Adjacent Undissolved	1,2,3,4
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved and Adjacent Undissolved	4
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	4
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	4

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	<i>4</i>
5412	TIDAL MUD FLAT	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6111	SALINE MARSHES (LOW MARSH)	Dissolved	<i>1,2,3,4</i>
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	<i>1,2,3,4</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1,2,3,4</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>4</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	<i>4</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>4</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>4</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3,4</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
7400	ALTERED LANDS	Undissolved and Adjacent Undissolved	<i>4</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1,2,3,4</i>

Land Use - Land Cover Selection and Patch Type Rationale

Breeding Savannah Sparrows are obligate grassland birds that evolved with large open native grasslands with different vegetation components to successfully breed, including high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance (Askins 2002). Savannah Sparrows nest on the ground, often in thick vegetation or at the base of a woody shrub in areas with high litter depth and prefer open grasslands with patches of dense vegetation (Wheelwright and Rising 2020), including shrubs and small saplings (Peterjohn 2006, Swanson et al. 2002). Suitable breeding habitat for Savannah Sparrows include hayfields and pastures, as well as airports, fallow fields, and other large grassland areas (Vickery et al. 1994; Shriver et al. 2005; Wheelwright and Rising 2020, Bollinger 1995; Shustack et al. 2010), including sedge bogs and upland grassy edges of salt marshes (Wheelwright and Rising 2020), even small patches of suitable habitat (Swanson 1998). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010). The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008).

Most grassland habitats in New Jersey are an artifact of other land uses, such as hayfields and sod farms, airports, and landfills, and all require some type of active management (mowing or burning) to remain suitable as grassland habitat (Petzinger expert opinion). In New Jersey, Savannah Sparrows are found breeding in agricultural areas, airports, landfills, parks, and marshes (Petzinger expert opinion, eBird.org).

Patch type Contiguous Area is selected for Savannah Sparrows due to their preference for larger areas, dynamic nature of grassland birds needing to change locations once habitats become unsuitable, and their ability to use suitable habitat adjacent to many urban LULCs and cross roads/runways, rural residential areas, and other open non-habitats that separate what would be an otherwise contiguous habitat.

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11. ENSP Biologist Expert Opinion – S. Petzinger
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Land Use Land Cover Selections and Patch Type Justifications

Sanderling

BIOPID 215

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>4,*</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1,3,5</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1,2</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>1,2</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>*</i>
7100	BEACHES	Undissolved	<i>1,2,4</i>

Land Use - Land Cover Selection and Patch Type Rationale

During spring migration (late-April to early June), sanderling forage primarily on horseshoe crab eggs on Delaware Bay beaches and creek-mouth areas, and on crustaceans, bivalves and polychaetes on Atlantic coast beaches, intertidal areas, and impoundments (Burger et al. 1997, Clark et al. 1993, Macwhirter et al. 2002). Highest feeding densities are most often associated with prey densities that are seasonally abundant or abundant but patchily distributed spatially and temporally (Burger et al. 1997, Clark et al. 1993, Macwhirter et al. 2002). During fall migration (mid-July through November), sanderling suitable foraging habitats are primarily the hard-packed sandy beaches of the Atlantic coast, but also include tidal marsh, and intertidal marsh and mudflat (Burger et al. 1997, Clark et al. 1993, Macwhirter et al. 2002). Sanderling movements are mostly driven by tidal cycles between low-tide foraging areas and high-tide roost sites (Burger et al. 1997, Clark et al. 1993, Macwhirter et al. 2002). As Sanderlings spend more than half of the year on migratory stopovers and wintering sites in New Jersey, and along the US East Coast, Central and northern South America, protection of a network of essential sites is critical for annual survival and population stability.

Shorebird usage is limited to very specific habitats, and due to the level of survey effort in New Jersey, a great deal is known about these habitats. Patch type Limited Extent is applied because none of the LULC polygons are dissolved, and is consequently the most conservative patch type selection. A 100 m buffer was applied to all species occurrences to account for the dynamic accretion and deposition within the coastal community ecotone.

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1. Burger, J., L. Niles, and K. E. Clark. 1997. Importance of beach, mudflat, and marsh habitats to migrant shorebirds on Delaware Bay. *Biological Conservation* 79:283-292.
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- * ENSP biologist expert opinion - W. Pitts and A. Dey

Land Use Land Cover Selections and Patch Type Justifications

Savannah Sparrow

BIOPID 76

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
1800	RECREATIONAL LAND	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
2100	CROPLAND AND PASTURELAND	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
2400	OTHER AGRICULTURE	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1,2,3,4,5,6,7,8,9,10,11,12

6111	SALINE MARSHES (LOW MARSH)	Dissolved	<i>10,11,12</i>
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	<i>10,11,12</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>
7400	ALTERED LANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10,11,12</i>

Land Use - Land Cover Selection and Patch Type Rationale

Breeding Savannah Sparrows are obligate grassland birds that evolved with large open native grasslands with different vegetation components to successfully breed, including high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance (Askins 2002). Savannah Sparrows nest on the ground, often in thick vegetation or at the base of a woody shrub in areas with high litter depth and prefer open grasslands with patches of dense vegetation (Wheelwright and Rising 2020), including shrubs and small saplings (Peterjohn 2006, Swanson et al. 2002). Suitable breeding habitat for Savannah Sparrows include hayfields and pastures, as well as airports, fallow fields, and other large grassland areas (Vickery et al. 1994; Shriver et al. 2005; Wheelwright and Rising 2020, Bollinger 1995; Shustack et al. 2010), including sedge bogs and upland grassy edges of salt marshes (Wheelwright and Rising 2020), even small patches of suitable habitat (Swanson 1998). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010). The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008).

Most grassland habitats in New Jersey are an artifact of other land uses, such as hayfields and sod farms, airports, and landfills, and all require some type of active management (mowing or burning) to remain suitable as grassland habitat (Petzinger expert opinion). In New Jersey, Savannah Sparrows are found breeding in agricultural areas, airports, landfills, parks, and marshes (Petzinger expert opinion, eBird.org).

Patch type Contiguous Area is selected for Savannah Sparrows due to their preference for larger areas, dynamic nature of grassland birds needing to change locations once habitats become unsuitable, and their ability to use suitable habitat adjacent to many urban LULCs and cross roads/runways, rural residential areas, and other open non-habitats that separate what would be an otherwise contiguous habitat.

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11. ENSP Biologist Expert Opinion – S. Petzinger
12. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Sedge Wren

BIOPID 87

REGION Statewide

PATCH TYPE CP.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1,2,3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	1,2
1800	RECREATIONAL LAND	Adjacent Undissolved	2
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	1,2
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	1,2,3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1,2
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1,2,3,4
2400	OTHER AGRICULTURE	Adjacent Undissolved	1,2
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1,2,3,4
6111	SALINE MARSHES (LOW MARSH)	Adjacent Undissolved	2,4,5
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2,4,5
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	2,4,5
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1,2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1,2

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3,4</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent Undissolved	<i>1,2</i>
7440	DISTURBED TIDAL WETLANDS	Adjacent Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

According to Herkert et al. (2001): "Owing to its erratic movements, generally low site fidelity, and secretive habits, there have been relatively few field studies of this species (sedge wren), and thus many aspects of its natural history remain poorly known."

Sedge wrens use a variety of habitats for breeding in both upland and wetland areas with tall dense vegetation and moderate forb cover including pasture, dry and wet grasslands (Herkert et al. 2001; Denchant et al. 2002); and marsh areas (Herkert et al. 2001). However, sedge wrens prefer to breed in damp habitats dominated by grasses and sedges frequently at the margins of marshes and avoid areas with persistent standing water (Herkert et al. 2001, Denchant et al. 2001, Torok 2004, Peterjohn 2006). Sedge wrens will abandon a breeding site if it becomes too wet or dry (Herkert et al. 2001, Denchant et al. 2001, Torok 2004). They are found more often in areas with medium shrub densities (Herkert et al. 2001). Sedge wren breeding range in New Jersey has been suggested as the coastal strip from Burlington County through Cape May and north to the Hackensack Meadowlands (Walsh et al. 1999). However, most records come from the along the Delaware bayshore in Cumberland and Cape May Counties and the large marsh complexes of northeastern Jersey (Walsh et al. 1999).

There is little information on habitat use during non-breeding season. Herkert et al. (2001) found sedge wrens using a variety of habitats during winter including brackish and freshwater sedge meadows and marshes, pine savannas, old fields with dense, matted grass or weeds; grassy edges of marshes, and sometimes dry, grassy places, as long as cover is at least 60–90 cm tall. Sedge wrens are also found to frequent grassy marshes in coastal areas and dry grass fields.

Patch type Cardinal-Proximate is selected for sedge wrens since they are habitat specialists and are adapted to exploiting patchy, short-lived habitats within the landscape and will change locations once habitats become unsuitable (Herkert et al. 2001). In response to the changing nature of the temporary habitats they breed in, sedge wrens have low site fidelity and will change breeding locations to take advantage of current conditions (Herkert et al. 2001, Denchant et al. 2001, Torok 2004). Patch type Cardinal-Proximate dissolves the primary (cardinal) polygons and values adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat for sedge wrens. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates breeding, foraging and rearing young requirements. This approach limits the habitat valued to that which the population uses but accommodates its need for larger habitat areas.

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Land Use Land Cover Selections and Patch Type Justifications

Semipalmated Sandpiper

BIOPID 216

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>4,*</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1,3,5</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1,2,4</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>1,2</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>*</i>
7100	BEACHES	Undissolved	<i>1,2,4</i>

Land Use - Land Cover Selection and Patch Type Rationale

During spring migration (late-April to early June), semipalmated sandpipers forage on horseshoe crab eggs on Delaware Bay beaches and creek-mouth areas, and on polychaete and oligochaete worms on Atlantic coast beaches and marshes, intertidal areas, and impoundments (Burger et al. 1997, Clark et al. 1993, Hicklin and Gratto-Trevor 2010). Highest feeding densities are most often associated with prey densities that are seasonally abundant or abundant but patchily distributed spatially and temporally (Burger et al. 1997, Clark et al. 1993, Hicklin and Gratto-Trevor 2010). During fall migration (mid-July through November), semipalmated sandpipers suitable foraging habitats include Atlantic coast beach, tidal marsh, and intertidal marsh and mudflat (Burger et al. 1997, Clark et al. 1993, Hicklin and Gratto-Trevor 2010). Semipalmated sandpiper movements are mostly driven by tidal cycles between low-tide foraging areas and high-tide roost sites (Burger et al. 1997, Clark et al. 1993, Hicklin and Gratto-Trevor 2010). As Semipalmated sandpipers spend more than half of the year on migratory stopovers along the US East Coast and wintering areas in northern South America, protection of a network of essential sites is critical for annual survival and population stability.

Shorebird usage is limited to very specific habitats, and due to the level of survey effort in New Jersey, a great deal is known about these habitats. Patch type Limited Extent is applied because none of the LULC polygons are dissolved, and is consequently the most conservative patch type selection. A 100 m buffer was applied to all species occurrences to account for the dynamic accretion and deposition within the coastal community ecotone.

Literature Citations

1. Burger, J., L. Niles, and K. E. Clark. 1997. Importance of beach, mudflat, and marsh habitats to migrant shorebirds on Delaware Bay. *Biological Conservation* 79:283-292.
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- * ENSP biologist expert opinion - W. Pitts and A. Dey

Land Use Land Cover Selections and Patch Type Justifications

Sharp-shinned Hawk

BIOPID 240

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4230	PLANTATION	Undissolved	1
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1

Land Use - Land Cover Selection and Patch Type Rationale

Sharp-shinned hawks nest in most forest types across their range (Bildstein and Meyer 2000). This species is reported as being dependent on contiguous forests (as summarized in Bildstein and Meyer 2000).

Patch type Limited Extent is selected to value forest habitats within and associated with the species' occurrence location and its approximate home range as represented by the SOA.

Literature Citations

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[doi:10.2173/bna.482](https://doi.org/10.2173/bna.482)

Land Use Land Cover Selections and Patch Type Justifications

Short-eared Owl

BIOPID 273

REGION Statewide

PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
2100	CROPLAND AND PASTURELAND	Dissolved	1-7
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	2,4,6,7
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-7
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	2,4,6,7
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	4,6,7
5412	TIDAL MUD FLAT	Dissolved	2,4,6,7
6111	SALINE MARSHES (LOW MARSH)	Dissolved	2,4,6,7
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2,4,6,7
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	4
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	2,4,6,7
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	2,4,6,7
6240	HERBACEOUS WETLANDS	Dissolved	2,4,6,7
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	4
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	2,4,6,7
7440	DISTURBED TIDAL WETLANDS	Dissolved	2,4,6,7

Land Use - Land Cover Selection and Patch Type Rationale

In the Mid-Atlantic region, obligate grassland birds have existed within native and man-made grasslands in agricultural landscapes for centuries (Askins 2002). These species originally evolved in native grasslands which are characterized by high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance) (Askins 2002). Today, New Jersey's grasslands are composed of agriculture, airports, and other early successional habitat types that require management to remain suitable as habitat. The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULCs are not frequent enough to capture the changes to a given site.

The short-eared owl is a raptor of open fields, marshes and grasslands and is active during both day and evening (Dechant et al. 2003; Wiggins 2004; Wiggins et al. 2006). These owls require large blocks of contiguous grassland for nesting, ideally a mosaic of grassland and associated wetlands, and they also prefer such areas for foraging (Dechant et al. 2003, Wiggins 2004, Wiggins et al. 2006). Short-eared owls prey on small mammals that also use grassland habitats (Holt 1993) and they will change both breeding and wintering locations depending on the abundance of food supplies and habitat conditions. Their nomadic nature also indicates a need for large, contiguous habitat areas (Holt 1993, Dechant et al. 2003, Wiggins 2004, Wiggins et al. 2006). In New Jersey, breeding short-eared owls are found along the coast in tidal and brackish marshes and inland grasslands (Liguori 2003). Phragmites dominated wetlands add to the field/grassland mosaic short-eared owls depend on (Liguori 2003).

Patch type Contiguous Area is selected for short-eared owls because this species relies on dynamic habitat types and requires large, contiguous habitat areas for both breeding and non-breeding. Patch type Contiguous Area dissolves the selected LULC classes into contiguous patches of habitat that best represent the species need to follow food supplies and provide nesting habitat.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Snowy Egret

BIOPID 202

REGION Statewide

PATCH TYPE LE.1 Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5412	TIDAL MUD FLAT	Undissolved	<i>2</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1,2</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>1,2</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>2</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	<i>2</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1,2</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1,2</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1,2</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Snowy egrets use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in shrubs (such as marsh elder, *Iva frutescens*), trees (such as Atlantic white cedar, *Juniperus virginiana*), and in the Atlantic coastal marsh islands (Burger 1978, Parsons & Master 2000). They have also been documented nesting in phragmites (*Phragmites australis*) (Davis per. obs.). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Parsons & Master 2000, Davis expert opinion).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in discrete colonies that are easily demarcated. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only highlight habitats being used by this species. Therefore this patch type, which does not dissolve LULC polygons, is the best fit for this species.

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[doi:10.2173/bna.489](https://doi.org/10.2173/bna.489)

* ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Snowy Egret

BIOPID 203

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	1,3
5200	NATURAL LAKES	Undissolved	1,3
5300	ARTIFICIAL LAKES	Undissolved	1,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1,3
5411	OPEN TIDAL BAYS	Undissolved	1,3
5412	TIDAL MUD FLAT	Undissolved	2
5420	DREDGED LAGOON	Undissolved	1,3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	2
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	2
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	2

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	2
6240	HERBACEOUS WETLANDS	Undissolved	1-3
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Undissolved	2
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	2
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	2
7440	DISTURBED TIDAL WETLANDS	Undissolved	2

Land Use - Land Cover Selection and Patch Type Rationale

Snowy Egrets forage on a variety of prey items including fish, insects, worms, crabs, shrimp, frogs and snakes. They use open water to stalk aquatic prey, and they hunt in marshes, on mudflats and forest edges associated with wetlands for many of the other items they eat (Custer & Osborn 1978, Parsons & Master 2000, Willard 1977).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in easily demarcated colonies. These colonies serve as the base for the foraging models, and this makes it fairly easy to identify and map the areas likely to be used for foraging around any given colony. This patch type allows for the habitat that is most likely used to be valued without extending it to areas that are less likely to be used. In an additional effort to avoid valuing habitat that is not used by this species, some LULC polygons are coded "Riparian Undissolved" so that they are only valued when adjacent to water, and therefore attractive to this species.

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Land Use Land Cover Selections and Patch Type Justifications

Tricolored Heron

BIOPID 192

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5412	TIDAL MUD FLAT	Undissolved	3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2,3
6130	VEGETATED DUNE COMMUNITIES	Undissolved	3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	*
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1-3
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1-3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1-4
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1-4
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1-4
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1-4
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1-3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1-3
7440	DISTURBED TIDAL WETLANDS	Undissolved	3

Land Use - Land Cover Selection and Patch Type Rationale

Tricolored herons use a variety of nesting substrate to lay their eggs and raise their young. In NJ, they are often found nesting in shrubs (such as marsh elder, *Iva frutescens*), trees (such as black cherry, *Prunus serotina*), and in the Atlantic coastal marsh islands (Frederick 1997, Kushlan 1978). They have also been documented nesting in phragmites (*Phragmites australis*) (Davis personal observation). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Frederick 1997, Davis expert opinion).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in discrete colonies that are easily demarcated. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat. Patch type Limited Extent is the best option for this since it will only highlight habitats being used by this species. Therefore this patch type, which does not dissolve LULC polygons, is the best fit for this species.

Literature Citations

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- * ENSP biologist expert opinion – C. Davis

Land Use Land Cover Selections and Patch Type Justifications

Tricolored Heron

BIOPID 193

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	1
5200	NATURAL LAKES	Undissolved	1
5300	ARTIFICIAL LAKES	Undissolved	1
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1
5411	OPEN TIDAL BAYS	Undissolved	1
5412	TIDAL MUD FLAT	Undissolved	1
5420	DREDGED LAGOON	Undissolved	1
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	2
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	2
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	2
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	2

6240	HERBACEOUS WETLANDS	Undissolved	<i>2</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Undissolved	<i>2</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	<i>2</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	<i>2</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

Tricolored herons forage almost exclusively on fish. They use open water to stalk aquatic prey, and they hunt in marshes, on mudflats and forest edges associated with wetlands for many of the items they occasionally eat (insects, crustaceans and frogs) (Bancroft et. al 1994, Belser & Post 1994, Frederick 1997, Rodgers 1978).

Patch type Limited Extent is selected for this species. They are a well-surveyed species that nests in easily demarcated colonies. These colonies serve as the base for the foraging models, and this makes it fairly easy to identify and map the areas likely to be used for foraging around any given colony. This patch type allows for the habitat that is most likely used to be valued without extending it to areas that are less likely to be used. In an additional effort to avoid valuing habitat that is not used by this species, some LULC polygons are coded "Riparian Undissolved" so that they are only valued when adjacent to water, and therefore attractive to this species.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Upland Sandpiper

BIOPID 77

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Dissolved	1,2,3,4,9,10
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	3,4
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	3,4
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1,2,3,4,9,10
1800	RECREATIONAL LAND	Dissolved	4
2100	CROPLAND AND PASTURELAND	Dissolved	1,2,3,4
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	3,4
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	3,4
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1,2,3,4
6120	FRESHWATER TIDAL MARSHES	Dissolved	3,4
6240	HERBACEOUS WETLANDS	Dissolved	3,4
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	3,4
7440	DISTURBED TIDAL WETLANDS	Dissolved	4

Land Use - Land Cover Selection and Patch Type Rationale

Breeding Upland Sandpipers are area-sensitive, obligate grassland birds that evolved with large open native grasslands with different vegetation components to successfully breed, including high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground resulting from grazing, fires, and other disturbance (Askins 2002, Houston et al. 2020). Upland Sandpipers nest on the ground and require grasslands of various heights for rearing broods (Houston and Bowen 2001, Bolster 1990); short vegetation for foraging, taller vegetation (including shrubs) for nesting and providing cover and foraging for chicks (Houston et al. 2020, Dechant et al. 2002) and use dry grasslands “with low to moderate forb cover, low woody cover, moderate grass cover, moderate to high litter cover, and little bare ground” (Dechant et al. 2002). Breeding habitat exists in both native and man-made grasslands in agricultural landscapes (Askins 2002), including stubble and fallow fields, pastures, hayfields, crop fields, road rights-of-way, marshes, mowed/burned blueberry barrens, shooting ranges, and recreational fields (Houston et al. 2020). The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008).

Breeding territory sizes differ between males and females and average 8 ha for males and 85.6 ha for females (Dechant et al. 1999, Houston et al. 2020), indicating that large, contiguous areas of suitable habitat are required for Upland Sandpipers (Houston et al. 2020, Dechant et al. 2002) to breed successfully; as patches of suitable habitat become smaller and more fragmented (separated from each other by forests or urban/suburban developments), upland sandpipers cease to use the site for breeding (Shriver et al. 2005).

In eastern states where fewer agricultural grasslands available, the largest populations of breeding Upland Sandpipers were found on air force bases and airports (Houston and Bowen 2001, Dechant et al. 2002, Shriver et al. 2005). The same is true in New Jersey; most grassland habitats in New Jersey are an artifact of other land uses, such as hayfields and sod farms, airports, and landfills, and all require some type of active management (mowing or burning) to remain suitable as grassland habitat (Petzinger expert opinion). Upland Sandpiper sightings reported in eBird.org during the breeding season in New Jersey highlight the importance of air force bases and airports for the few remaining breeding Upland Sandpipers in the state (eBird.org).

Patch type Contiguous Area is selected for Upland Sandpipers due to their requirement for large, contiguous habitat, dynamic nature of grassland birds needing to change locations once habitats become unsuitable, and their ability to use suitable habitat adjacent to many urban LULCs and cross roads/runways, rural residential areas, and other open non-habitats that separate what would be an otherwise contiguous habitat.

A minimum patch size of 25 ha was selected for upland sandpipers because large, contiguous areas of suitable habitat are required for breeding Upland Sandpipers, and the patch size of 25 ha was chosen for breeding populations based on studies located closest to New Jersey (Mitchell et al. 2000). That said, given the breeding territory size of 85.6 ha for breeding female upland sandpipers, a 25-ha grassland patch surrounded by forest is not likely to provide suitable breeding habitat for upland sandpipers.

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10. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Upland Sandpiper

BIOPID 78

REGION Statewide

PATCH TYPE LE.1 Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1440	AIRPORT FACILITIES	Undissolved	<i>1,2</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1,2</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1,2</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1,2</i>
1800	RECREATIONAL LAND	Undissolved	<i>1,2</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1,2</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1,2</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1,2</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1,2</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1,2</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>1,2</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1,2</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>

6240	HERBACEOUS WETLANDS	Undissolved	<i>1,2</i>
7400	ALTERED LANDS	Undissolved	<i>1,2</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1,2</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Upland sandpipers are one of the few obligate grassland bird species that are long-distance migrants (Houston and Bowen 2001) and protecting migratory stopovers is important. During migration, upland sandpipers generally use large plowed fields, mowed hayfields, and pastures for staging and stopover feeding sites. They also occur in dry salt-hay marshes (Vickery et al. 2010). As the migratory habitats of upland sandpipers are not well known (see Vickery et al. 2010), brush/shrubland was selected when it is associated within the agricultural landscape.

Patch type Limited Extent is selected for upland sandpiper for migratory observations, because during migration birds utilize small areas of habitat for short periods of time before they move southward. Therefore, the selected LULC polygons did not need to be dissolved. The resulting polygons value the habitat important to migrating upland sandpipers while limiting the extension into areas that are less likely to be used during migration.

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Land Use Land Cover Selections and Patch Type Justifications

Veery

BIOPID 79

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2,3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2,3</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2,3</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,2,3</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,2,3</i>

6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1,2,3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2,3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Veeries primarily breed in deciduous or mixed forest, but can also use coniferous and hemlock forests (USFWS 2001, Rosenberg et al. 2003). They are area sensitive and intolerant of forest fragmentation even though they use dense understory within forest gaps and disturbed forest (Rosenberg et al 2003, Bevier et al. 2004). Moisture and shrub cover are primary factors in habitat selection (Bevier et al. 2004). In the Middle Atlantic veeries require forests of 20 ha for 50% probability of occurrence but they can breed in red maple swamps as small as 1 hectare as long as there is a large amount of forested habitat in the area (Bevier et al. 2004). The amount of area needed for suitable breeding habitat is related to the amount of fragmentation in the area but they can tolerate smaller fragments of 1 - 8 ha (Rosenberg et al 2003).

Patch type Contiguous Area is applied because veeries breed in non-residential forest openings within large tracts of forest (Rosenberg et al. 2003, Bevier et al. 2004). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it is the best patch type for this species at this time because it dissolves the habitat patches together, thus depicting the contiguous habitat patches that the local population, based upon species occurrences, needs to breed.

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Land Use Land Cover Selections and Patch Type Justifications

Vesper Sparrow

BIOPID 80

REGION Statewide

PATCH TYPE CP.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent Undissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
1800	RECREATIONAL LAND	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1,2,3,4,5,6,7,8</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6,7,8</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6,7,8</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6,7,8</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2,3,4,5,6,7,8</i>

4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1,2,3,4,5,6,7,8</i>
7400	ALTERED LANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1,2,3,4,5,6,7,8,9,10</i>

Land Use - Land Cover Selection and Patch Type Rationale

Breeding Vesper Sparrows are area sensitive, obligate grassland birds that evolved with large open native grasslands with different vegetation components to successfully breed, including high species richness of grasses and perennial forbs, varying litter depths, and varying extent of bare ground (resulting from grazing, fires, and other disturbance (Askins 2002). Vesper Sparrows nest on the ground, often in thick vegetation or at the base of a woody shrub in areas with high litter depth and prefer dry, open habitats with short, sparse and patchy vegetation with some bare ground, and low to moderate shrub or forb cover (Jones and Cornely 2020, Dechant et al. 2003, Peterjohn 2006), including shrubs and small saplings (Dechant et al. 2003, Jones and Cornely 2020). Suitable breeding habitat for Vesper Sparrows include native prairies, hayfields and pastures, airports, fallow fields, reclaimed mines, croplands, grassy roadsides, grassy areas with scattered trees and shrubs (Jones and Cornely 2020, Dechant et al. 2003, Shriver et al. 2005, Peterjohn 2006, Morgan and Burger 2008), and even blueberry barrens (Vickery et al. 1994). For grassland obligate bird species in the Northeast, vegetation structure may be more important than composition for these species and management of these habitats provide high quality breeding habitat (Norment et al. 2010). The dynamic nature of agricultural practices (e.g., field and crop rotation, field resting, fallow fields) means that all cropland is considered primary for grassland birds, since the updates of LULC revisions are not frequent enough to accurately identify the present condition of grass or agricultural habitat at a given site (Morgan and Burger 2008).

Most grassland habitats in New Jersey are an artifact of other land uses, such as hayfields and sod farms, airports, and landfills, and all require some type of active management (mowing or burning) to remain suitable as grassland habitat (Petzinger expert opinion). In New Jersey, Vesper Sparrows are found breeding in agricultural areas, airports, landfills, parks, and marshes (Petzinger expert opinion, eBird.org).

Patch type Contiguous Area is selected for Vesper Sparrows due to their area sensitivity, dynamic nature of grassland birds needing to change locations once habitats become unsuitable, and their ability to use suitable habitat adjacent to many urban LULCs and cross roads/runways, rural residential areas, and other open non-habitats that separate what would be an otherwise contiguous habitat. A minimum patch size was not selected for this species because this species can breed in small sites (Jones and Cornely 2020).

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Land Use Land Cover Selections and Patch Type Justifications

Vesper Sparrow

BIOPID 81

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1440	AIRPORT FACILITIES	Undissolved	<i>4,7</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>2</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>2</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>2</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1,5</i>
1800	RECREATIONAL LAND	Undissolved	<i>1,3,4,5</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1,3,4,5,6,7</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1,3,4,5,6,7</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1,3,4,5,6,7</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1,3,4,5</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,3,4,5</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,3,4,5</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1,3,4,5</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,3,4,5</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1,3,4,5</i>

4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1,3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2,3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2,3</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1,3</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1,3,5</i>
7400	ALTERED LANDS	Undissolved	<i>1,3,5</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1,3</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1,3</i>

Land Use - Land Cover Selection and Patch Type Rationale

During migration, Vesper Sparrows use similar habitat types during breeding (airports, grasslands/fallow fields, grassy areas, hedgerows/fencerows in cropland, hayfields; Morgan and Burger 2008, Jones and Cornely 2020, Dechant et al. 2003, Shriver et al. 2005, Peterjohn 2006) in addition to barren areas and weedy ditches (Jones and Cornely 2020).

In New Jersey, Vesper Sparrows are observed during the non-breeding season in agricultural areas, airports, landfills, parks, and marshes/wetlands (eBird.org). Based on accepted observations, non-breeding vesper sparrows are also found using shrubland habitat types at a frequency that indicates migrating birds are actively selecting that habitat type (ENSP 2010).

Patch Type Limited Extent was chosen so that LULC classes are not dissolved into patches because Vesper Sparrows are not area sensitive while migrating. Therefore, only habitat important for migrating vesper sparrows while limiting the expansion into areas that are less likely to be used by Vesper Sparrows during migration.

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7. eBird.org

Land Use Land Cover Selections and Patch Type Justifications

Winter Wren

BIOPID 83

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	<i>1,2</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	<i>1,2</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2</i>

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,2</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,2</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,2</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Winter wrens use all types of forest near water, including deciduous riparian forests, hardwood forests, and mixed conifer-hardwood forests, especially old-growth structures (snags, downed logs, and large trees) for nesting, foraging, and roosting, and frequently nest and forage near water, particularly streams, but also near bogs, swamps, and lakes (Gould et al. 1999, Hejl et al. 2002). Other important aspects of breeding habitat include dead wood (fallen logs and coarse woody debris), standing dead trees, stumps, slash piles, and very large trees found in old-growth and mature conifer forests (Hejl et al. 2002). In some areas, winter wrens are associated with greater shrub development, often where natural disturbance has created small openings or edges in forest, and occasionally in slash following logging operations (Hejl et al. 2002). Winter wrens have been observed feeding along banks of streams, frequently pecking at water and sometimes immersing head, apparently foraging on water insects (Hejl et al. 2002).

Patch type Contiguous Area is applied because the winter wrens are forest birds with large territories and patchy distributions (Hejl et al 2002). Although patch type Contiguous Area may appear to value more forested habitat than necessary, it represents the contiguous forest and scrub-shrub needed by the local breeding population based on documented occurrences.

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Land Use Land Cover Selections and Patch Type Justifications

Wood Thrush

BIOPID 84

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	3,6,12,13
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1,2,3,4,6,7,8,9,10,11,12
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1,2,3,4,7,8,9,10,11,12,13
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1,2,3,4,6,7,8,9,10,11,12
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1,2,3,4,7,8,9,10,11,12,13
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1,2,3,4,6,7,8,9,10,11,12
1710	CEMETERY	Undissolved	1,2,3,4,6,7,8,9,10,11,12
1800	RECREATIONAL LAND	Undissolved	1,2,3,4,6,7,8,9,10,11,12
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2,3,4,5,6,7,8,9,10,11,12,13
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,3,4,5,6,7,8,9,10,11,12,13
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2,3,4,5,6,7,8,9,10,11,12
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,3,4,5,6,7,8,9,10,11,12
4230	PLANTATION	Undissolved	1,2,3,4,5,6,7,8,9,10,11,12
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,2,3,4,5,6,7,8,9,10,11,12,13
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,3,4,5,6,7,8,9,10,11,12,13

4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i><u>1,2,3,4,5,6,7,8,9,10,11,12,13</u></i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i><u>1,2,3,4,5,6,7,8,9,10,11,12,13</u></i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i><u>1,2,3,4,7,9,10,11,13</u></i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i><u>1,2,3,4,7,9,10,11</u></i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i><u>1,2,3,4,7,9,10,11</u></i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i><u>1,2,3,4,5,6,7,8,9,10,11,12,13</u></i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i><u>1,2,3,4,5,6,7,8,9,10,11,12</u></i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i><u>1,2,3,4,5,6,7,8,9,10,11,12,13</u></i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i><u>1,2,3,4,7,9,10,11</u></i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i><u>1,2,3,4,7,9,10,11</u></i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i><u>1,2,3,4,7,9,10,11</u></i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i><u>1,2,3,4,7,9,10,11</u></i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i><u>1,2,3,4,5,6,7,8,9,10,11,12,13</u></i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i><u>1,2,3,4,5,6,7,8,9,10,11,12,13</u></i>

Land Use - Land Cover Selection and Patch Type Rationale

Wood thrushes breed in interior and edges of deciduous and mixed forests in cool, moist sites near water and require moderate to dense understory with a lot of shade, moist soil, and decaying leaf litter (Evans et al. 2020, USFWS 2001, Rosenberg et al. 2003). Shrubs and understory trees are important for nesting, especially arrowwood, black gum spicebush, dogwood, and hemlock (Evans et al. 2020). Wood Thrushes will also breed in young regenerating forests, especially if 10-20% of the canopy is retained or the stand reaches pole stage, but are more common in forests with semi-open canopies (>50% canopy cover) or canopy gaps (Akresh et al. 2023, Lambert et al. 2017) and edges of young regenerating clearcuts (Wallendorf et al. 2007).

Wood Thrushes are area sensitive and more likely to occur in larger forests but may nest in 1-ha fragments and semi-wooded residential areas and parks (Evans et al. 2020). High suitability is in forest patches at least 81 ha (200 acres) with suitability declining in patches less than 40.5 ha (100 acres), but they can breed in smaller patches with lower reproductive success (Rosenberg et al. 2003). An analysis of spatial scale showed Wood Thrushes are forest dependent but also somewhat positively associated with urban intensity with a 10 km scale of effect; they also occurred in areas that had less forest cover within 0.2 km than what was available, shrublands and wetlands excluded (Paton et al. 2019). Important factors for reproductive success for wood thrush is forest size, amount of core area, amount of edge, and vegetation structure (Rosenberg et al. 2003).

In New Jersey, Wood Thrushes were also observed breeding within regenerating forests after seed tree silvicultural prescriptions, Atlantic white cedar swamps, open-canopy pine forests with deciduous understories, wooded backyards, and along the forested edge of powerline corridors (Petzinger expert opinion) in addition to large forested areas, forest edges, parks, and small woodlots within and surrounded by residential development and agriculture (eBird.org). Wood Thrushes can nest in closed-canopy forests with little understory vegetation provided some tall (>6 ft) saplings, understory trees, or shrubs, including spicebush and witch hazel, are present (Petzinger expert opinion).

Wood Thrush chicks move into deciduous sapling forests with fruiting trees and shrubs after leaving the nest (Evans et al. 2020, Vitz and Rodewald 2007) and used regenerating clearcuts (4-8 years post-management) more than closed-canopy mature forests (Stoleson 2013, Lambert et al. 2017). Chicks were also found using open-canopy mid-successional pine forests, mature riparian forests, and forest edges, and preferred these habitat types more than mature closed-canopy oak-hickory forests and old fields (Anders et al. 1998). Adults were found in regenerating clearcuts (15-17 years post-management) after the chicks left the nest (Streby et al. 2011, Vega Rivera et al. 1999). This suggests that breeding Wood Thrush depend on mature forests and require forest disturbances to create regenerating forests, canopy gaps and open-canopy forest conditions with a variety of understory densities within a larger forested landscape.

Patch type Limited Extent is applied for wood thrush because, while they prefer larger forests, they will use small forest fragments, including wooded rural residential areas. Patch type Limited Extent will minimize the area of residential habitat valued by wood thrushes breeding in these areas.

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Land Use Land Cover Selections and Patch Type Justifications

Yellow-breasted Chat

BIOPID 86

REGION Statewide

PATCH TYPE CP*.1 Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	<i>1,2,3,4</i>
1440	AIRPORT FACILITIES	Adjacent Undissolved	<i>1,2</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1,2,3,4</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1,2,3,4</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1,2</i>
1800	RECREATIONAL LAND	Adjacent Undissolved	<i>1</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1,2,4</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1,2,4</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1,2,4</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,3,4</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1</i>
6240	HERBACEOUS WETLANDS	Adjacent Undissolved	<i>1</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	<i>1,2,3,4</i>

Land Use - Land Cover Selection and Patch Type Rationale

Yellow-breasted chats are considered a disturbance-dependent species. In the eastern United States, they breed in early second-growth forests, shrubby areas in abandoned agricultural fields, clear cuts, power-line right of ways, forest edges and openings of sufficient size (minimum of 0.5 ha) (Eckerle and Thompson 2001; Rittenhouse et al. 2007; Environment Canada 2011). They can be found in “low, dense vegetation without a closed tree canopy, including shrubby habitat along stream, swamp, and pond margins; forest edges, regenerating burned-over forest, and logged areas; and fencerows and upland thickets of recently abandoned farmland” (Eckerle and Thompson 2001). A habitat quality model developed by USGS found that the amount of maturing forest in the landscape surrounding yellow-breasted chat breeding habitat had a positive impact on those breeding populations (USGS online).

Patch type Cardinal-Proximate was selected because yellow-breasted chats are habitat specialists and are adapted to exploiting patchy, short-lived habitats within the landscape and will change locations once habitats become unsuitable (Eckerle and Thompson 2001; Rittenhouse et al. 2007; Environment Canada 2011). In response to the changing nature of the temporary habitats they breed in, yellow-breasted chats have low site fidelity and will change breeding locations to take advantage of current conditions (Eckerle and Thompson 2001). Patch type Cardinal-Proximate adequately identifies the habitat required by yellow-breasted chats by dissolving the primary (cardinal) polygons and valuing adjacent undissolved (proximate) LULC polygons to form large, contiguous patches of suitable breeding and foraging habitat. Proximate LULC polygons are only valued if they are adjacent to valued breeding habitat that accommodates yellow-breasted chats breeding, foraging and rearing young requirements. Disturbance-dependent birds will predominately use early successional habitat but will also use forest and agricultural edges. Therefore, early-successional habitats were selected as cardinal and the forested and agricultural classes were chosen as proximate. A final step was the selection of several LULC classes that were not dissolved. These classes are only used by the species if part of the SOA for that population and therefore are only valued if the SOA intersects with it. This approach limits the amount of habitat valued but recognizes that those LULC types are important to the habitat requirements of that population. A particular example of this is LULC 2100 (cropland and pasture land).

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Land Use Land Cover Selections and Patch Type Justifications

Yellow-crowned Night-heron

BIOPID 10

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	Undissolved	3
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	3
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	3
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	2,3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	2,3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	2,3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	2,3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	2,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	2,3
5412	TIDAL MUD FLAT	Dissolved	4
6111	SALINE MARSHES (LOW MARSH)	Dissolved	2,3
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	2,3

6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>2,3</i>
6130	VEGETATED DUNE COMMUNITIES	Dissolved	<i>4</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	<i>1-3</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-3</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-3</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>2,3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-3</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>4</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey, yellow-crowned night-herons nest primarily in coastal marshes, utilizing vegetation as nesting substrate, including marsh elder (*Iva frutescens*), Eastern red cedar (*Juniperus virginiana*) and phragmites (*Phragmites australis*) (Bagley and Grau 1979, Bentley 1994, Watts 1989). Increasingly, this species has been noted using residential areas throughout the state to nest, often where tall deciduous trees or clusters of cedars are interspersed among homes, parks and businesses (Watts 1989). Although they will not nest in open mudflat habitat, when these areas are adjacent to the colony they play an important role for roosting and resting breeding birds and newly fledged young. The non-incubating/attending bird can be away from the nest proper, yet remain close enough should a need to get to the nest quickly arise (Watts 2011).

Patch type Cardinal-Proximate is applied for this species to account for its proclivity to nest in both natural and more suburban/urban locations (Watts 1989). Since the colonies in the marsh islands are well-surveyed and discrete, overlapping the SOA with only the intersecting patches (versus creating contiguous patches) is satisfactory to capture the breeding birds' habitat. Additionally, when the night-herons nest in more developed areas, this patch type will prevent overvaluing areas that are not typically considered habitat (such as residential neighborhoods in coastal barrier islands) but that is nonetheless utilized by this species and must be accounted for. These are represented by the 1000 level (urban) LULC selections, which are not dissolved so as to minimize overvaluing these areas. The adjacent undissolved LULC polygons were selected since they will likely only be used when adjacent to primary selections. The nesting and foraging habitats of this species are mapped and modeled separately, so this patch type need only value the breeding habitat.

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Land Use Land Cover Selections and Patch Type Justifications

Yellow-crowned Night-heron

BIOPID 197

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5100	STREAMS AND CANALS	Undissolved	2,3
5200	NATURAL LAKES	Undissolved	2,3
5300	ARTIFICIAL LAKES	Undissolved	2,3
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	2,3
5411	OPEN TIDAL BAYS	Undissolved	2,3
5412	TIDAL MUD FLAT	Undissolved	1,2,3
5420	DREDGED LAGOON	Undissolved	2,3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	2,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	2,3
6120	FRESHWATER TIDAL MARSHES	Undissolved	2,3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	2,3
6210	DECIDUOUS WOODED WETLANDS	Riparian Undissolved	2,3
6220	CONIFEROUS WOODED WETLANDS	Riparian Undissolved	2,3
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	2,3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Riparian Undissolved	2,3

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	2,3
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	2,3
6240	HERBACEOUS WETLANDS	Undissolved	2,3
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Riparian Undissolved	2,3
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Riparian Undissolved	2,3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Riparian Undissolved	2,3
7440	DISTURBED TIDAL WETLANDS	Undissolved	1,2,3

Land Use - Land Cover Selection and Patch Type Rationale

Yellow-crowned night-herons forage almost exclusively on salt- and freshwater crustaceans, which they will stalk and capture along the edges of bodies of water such as lakes, rivers, tidal bays, inlets, and mudflats associated with marsh and wetland habitats (Bentley 1994, Mumford & Keller 1984, Watts 1995).

Patch type Limited Extent is selected because yellow-crowned night-herons are a highly surveyed species in the state and their distribution is well understood. The nesting colonies on which the foraging models are based are discrete, delineated colonies which are well documented and mapped. Using Limited Extent patch type values the habitat that is most likely used by the associated colony (which is based on an understanding of foraging commutes) without extending it to areas that are less likely to be used. This is especially critical in valuing foraging areas associated with more urban colonies as this is an area where overvaluing is liable to be of most concern. The LULC polygons that are land-based were coded "Riparian Undissolved" because they are areas that are only important to yellow-crowned night-herons for foraging when they are located adjacent to water.

Literature Citations

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[doi:10.2173/bna.161](https://doi.org/10.2173/bna.161)

Land Use Land Cover Selections and Patch Type Justifications

Brook Floater

BIOPID 245

REGION Statewide

PATCH TYPE Stream Centerline

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved	<i>1-5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes. Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams, whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas. Species such as the creeper are considered habitat generalists; thriving in streams, rivers, lakes and ponds. Species such as tidewater mucket and eastern pondmussel are often found in areas of tidal freshwater. All of the above mentioned aquatic habitats are reflected in the Landscape Project stream layer.

For Stream/River associated species, stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2024), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 10 km of each other, these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species.

1. If two occurrences are within 10 km length of streamline, the entire streamline between these occurrences should be valued/included.
Measure from the edge of the SOA polygon (for SF points, lines, and polygons).
2. If a lake/pond is between two occurrences that are within 10 km of one another, exclude the lake/pond.
3. Lakes or ponds should be excluded unless the occurrence is in a lake or pond.
 - a. Lakes/ponds are barriers to upstream and downstream movement.
4. For a single occurrence (without another occurrence within 10 km) or on the most upstream or downstream occurrence, value the stream centerline for that occurrence 0.75 km upstream and downstream from the occurrence, unless there is a barrier to upstream or downstream movement (lake/pond). Intersect the SOA with the stream centerlines and make the 0.75 km measurement from the edges of the SOA.
5. River/stream/tributaries that are connected to a river/stream/tributary between two occurrences should be included up to 0.75 km unless there is a barrier to upstream movement (lake/pond).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and larger waterbodies did not always intersect the centerline of the water feature. This also often happens as a result of changes in stream basemaps with mapping updates that alter the mapped stream location. In these cases, it was therefore necessary to select segments manually and designate them as habitat based on proximity of the occurrence. Dam mapping was not used as a barrier to mussel habitat mapping due to the large number of inaccuracies in the mapping data with many mapped dam features that longer exist or the many dams of such a small size and impact that they would not serve as a barrier to fish movement.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
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6. Strayer, D.L., and K.J. Jirka. 1997. The pearly mussels of New York state. New York State Museum Memoir 26. The University of the State of New York. 113 pp. + figures

* ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Creeper *BIOPID* 246 *REGION* Statewide *PATCH TYPE* Stream Centerline

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved	<i>1-5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes. Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams, whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas. Species such as the creeper are considered habitat generalists; thriving in streams, rivers, lakes and ponds. Species such as tidewater mucket and eastern pondmussel are often found in areas of tidal freshwater. All of the above mentioned aquatic habitats are reflected in the Landscape Project stream layer.

For Stream/River associated species that will also occur in lakes, ponds, and other waterbodies, stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2024), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 10 km of each other, these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species.

1. If two occurrences are within 10 km length of streamline, the entire streamline between these occurrences should be valued/included. *Measure from the edge of the SOA polygon (for SF lines and polygons).*
2. If a lake/pond is between two occurrences that are within 10 km of one another, include the lake/pond.
3. For a single occurrence (without another occurrence within 10 km) or on the most upstream or downstream occurrence, value the stream centerline for that occurrence 0.75 km upstream and downstream from the occurrence. Intersect the SOA with the stream centerlines and make the 0.75 km measurement from the edges of the SOA.
4. River/stream/tributaries that are connected to a river/stream/tributary between two occurrences should be included up to 0.75 km unless there is a barrier to upstream movement (lake/pond).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and larger waterbodies did not always intersect the centerline of the water feature. This also often happens as a result of changes in stream basemaps with mapping updates that alter the mapped stream location. In these cases, it was therefore necessary to select segments manually and designate them as habitat based on proximity of the occurrence. Dam mapping was not used as a barrier to mussel habitat mapping due to the large number of inaccuracies in the mapping data with many mapped dam features that longer exist or the many dams of such a small size and impact that they would not serve as a barrier to host fish movement.

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* ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Dwarf WedgemusselBIOPID 247REGION StatewidePATCH TYPE Stream Centerline

LU20	LABEL 20	LULC TREATMENT	CITATIONS
8888	STREAM CENTERLINE	Undissolved	1-5

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes. Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams, whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas. Species such as the creeper are considered habitat generalists; thriving in streams, rivers, lakes and ponds. Species such as tidewater mucket and eastern pondmussel are often found in areas of tidal freshwater. All of the above mentioned aquatic habitats are reflected in the Landscape Project stream layer.

For Stream/River associated species, stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2024), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 10 km of each other, these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species.

1. If two occurrences are within 10 km length of streamline, the entire streamline between these occurrences should be valued/included. *Measure from the edge of the SOA polygon (for SF lines and polygons).*
2. If a lake/pond is between two occurrences that are within 10 km of one another, include the lake/pond.
3. For a single occurrence (without another occurrence within 10 km) or on the most upstream or downstream occurrence, value the stream centerline for that occurrence 0.75 km upstream and downstream from the occurrence. Intersect the SOA with the stream centerlines and make the 0.75 km measurement from the edges of the SOA.
4. River/stream/tributaries that are connected to a river/stream/tributary between two occurrences should be included up to 0.75 km unless there is a barrier to upstream movement (lake/pond).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and larger waterbodies did not always intersect the centerline of the water feature. This also often happens as a result of changes in stream basemaps with mapping updates that alter the mapped stream location. In these cases, it was therefore necessary to select segments manually and designate them as habitat based on proximity of the occurrence. Dam mapping was not used as a barrier to mussel habitat mapping due to the large number of inaccuracies in the mapping data with many mapped dam features that longer exist or the many dams of such a small size and impact that they would not serve as a barrier to host fish movement.

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* ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Eastern Lampmussel *BIOPID* 248 *REGION* Statewide *PATCH TYPE* Stream Centerline

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved	<i>1-5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes. Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams, whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas. Species such as the creeper are considered habitat generalists; thriving in streams, rivers, lakes and ponds. Species such as tidewater mucket and eastern pondmussel are often found in areas of tidal freshwater. All of the above mentioned aquatic habitats are reflected in the Landscape Project stream layer.

For Stream/River associated species that will also occur in lakes, ponds, and other waterbodies, stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2024), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 10 km of each other, these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species.

1. If two occurrences are within 10 km length of streamline, the entire streamline between these occurrences should be valued/included. *Measure from the edge of the SOA polygon (for SF lines and polygons).*
2. If a lake/pond is between two occurrences that are within 10 km of one another, include the lake/pond.
3. For a single occurrence (without another occurrence within 10 km) or on the most upstream or downstream occurrence, value the stream centerline for that occurrence 0.75 km upstream and downstream from the occurrence. Intersect the SOA with the stream centerlines and make the 0.75 km measurement from the edges of the SOA.
4. River/stream/tributaries that are connected to a river/stream/tributary between two occurrences should be included up to 0.75 km unless there is a barrier to upstream movement (lake/pond).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and larger waterbodies did not always intersect the centerline of the water feature. This also often happens as a result of changes in stream basemaps with mapping updates that alter the mapped stream location. In these cases, it was therefore necessary to select segments manually and designate them as habitat based on proximity of the occurrence. Dam mapping was not used as a barrier to mussel habitat mapping due to the large number of inaccuracies in the mapping data with many mapped dam features that longer exist or the many dams of such a small size and impact that they would not serve as a barrier to host fish movement.

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* ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Eastern Pondmussel *BIOPID* 249 *REGION* Statewide *PATCH TYPE* Stream Centerline

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved	<i>1-5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes. Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams, whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas. Species such as the creeper are considered habitat generalists; thriving in streams, rivers, lakes and ponds. Species such as tidewater mucket and eastern pondmussel are often found in areas of tidal freshwater. All of the above mentioned aquatic habitats are reflected in the Landscape Project stream layer.

For Stream/River associated species that will also occur in lakes, ponds, and other waterbodies, stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2024), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 10 km of each other, these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species.

1. If two occurrences are within 10 km length of streamline, the entire streamline between these occurrences should be valued/included. *Measure from the edge of the SOA polygon (for SF lines and polygons).*
2. If a lake/pond is between two occurrences that are within 10 km of one another, include the lake/pond.
3. For a single occurrence (without another occurrence within 10 km) or on the most upstream or downstream occurrence, value the stream centerline for that occurrence 0.75 km upstream and downstream from the occurrence. Intersect the SOA with the stream centerlines and make the 0.75 km measurement from the edges of the SOA.
4. River/stream/tributaries that are connected to a river/stream/tributary between two occurrences should be included up to 0.75 km unless there is a barrier to upstream movement (lake/pond).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and larger waterbodies did not always intersect the centerline of the water feature. This also often happens as a result of changes in stream basemaps with mapping updates that alter the mapped stream location. In these cases, it was therefore necessary to select segments manually and designate them as habitat based on proximity of the occurrence. Dam mapping was not used as a barrier to mussel habitat mapping due to the large number of inaccuracies in the mapping data with many mapped dam features that longer exist or the many dams of such a small size and impact that they would not serve as a barrier to host fish movement.

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* ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Green Floater *BIOPID* 250 *REGION* Statewide *PATCH TYPE* Stream Centerline

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved	<i>1-5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes. Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams, whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas. Species such as the creeper are considered habitat generalists; thriving in streams, rivers, lakes and ponds. Species such as tidewater mucket and eastern pondmussel are often found in areas of tidal freshwater. All of the above mentioned aquatic habitats are reflected in the Landscape Project stream layer.

For Stream/River associated species, stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2024), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 10 km of each other, these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species.

1. If two occurrences are within 10 km length of streamline, the entire streamline between these occurrences should be valued/included.
Measure from the edge of the SOA polygon (for SF points, lines, and polygons).
2. If a lake/pond is between two occurrences that are within 10 km of one another, exclude the lake/pond.
3. Lakes or ponds should be excluded unless the occurrence is in a lake or pond.
 - a. Lakes/ponds are barriers to upstream and downstream movement.
4. For a single occurrence (without another occurrence within 10 km) or on the most upstream or downstream occurrence, value the stream centerline for that occurrence 0.75 km upstream and downstream from the occurrence, unless there is a barrier to upstream or downstream movement (lake/pond). Intersect the SOA with the stream centerlines and make the 0.75 km measurement from the edges of the SOA.
5. River/stream/tributaries that are connected to a river/stream/tributary between two occurrences should be included up to 0.75 km unless there is a barrier to upstream movement (lake/pond).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and larger waterbodies did not always intersect the centerline of the water feature. This also often happens as a result of changes in stream basemaps with mapping updates that alter the mapped stream location. In these cases, it was therefore necessary to select segments manually and designate them as habitat based on proximity of the occurrence. Dam mapping was not used as a barrier to mussel habitat mapping due to the large number of inaccuracies in the mapping data with many mapped dam features that longer exist or the many dams of such a small size and impact that they would not serve as a barrier to fish movement.

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In: Encyclopedia of Earth. Eds. Cutler J. Cleveland (Washington, D.C.:Environmental Information Coalition, National Council for Science and the Environment): (Retrieved: August 25, 2011).
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* ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Tidewater Mucket *BIOPID* 251 *REGION* Statewide *PATCH TYPE* Stream Centerline

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved	<i>1-5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes. Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams, whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas. Species such as the creeper are considered habitat generalists; thriving in streams, rivers, lakes and ponds. Species such as tidewater mucket and eastern pondmussel are often found in areas of tidal freshwater. All of the above mentioned aquatic habitats are reflected in the Landscape Project stream layer.

For Stream/River associated species that will also occur in lakes, ponds, and other waterbodies, stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2024), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 10 km of each other, these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species.

1. If two occurrences are within 10 km length of streamline, the entire streamline between these occurrences should be valued/included. *Measure from the edge of the SOA polygon (for SF lines and polygons).*
2. If a lake/pond is between two occurrences that are within 10 km of one another, include the lake/pond.
3. For a single occurrence (without another occurrence within 10 km) or on the most upstream or downstream occurrence, value the stream centerline for that occurrence 0.75 km upstream and downstream from the occurrence. Intersect the SOA with the stream centerlines and make the 0.75 km measurement from the edges of the SOA.
4. River/stream/tributaries that are connected to a river/stream/tributary between two occurrences should be included up to 0.75 km unless there is a barrier to upstream movement (lake/pond).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and larger waterbodies did not always intersect the centerline of the water feature. This also often happens as a result of changes in stream basemaps with mapping updates that alter the mapped stream location. In these cases, it was therefore necessary to select segments manually and designate them as habitat based on proximity of the occurrence. Dam mapping was not used as a barrier to mussel habitat mapping due to the large number of inaccuracies in the mapping data with many mapped dam features that longer exist or the many dams of such a small size and impact that they would not serve as a barrier to host fish movement.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.

2. Johnson, R.I. 1970. The systematics and zoogeography of the Unionidae (Mollusca: Bivaliva) of the southern Atlantic slope region. *Bulletin of the Museum of Comparative Zoology, Harvard University*, 140(6):263-449.
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6. Strayer, D.L., and K.J. Jirka. 1997. The pearly mussels of New York state. *New York State Museum Memoir* 26. The University of the State of New York. 113 pp. + figures

* ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Triangle FloaterBIOPID 252REGION StatewidePATCH TYPE Stream Centerline

LU20	LABEL 20	LULC TREATMENT	CITATIONS
8888	STREAM CENTERLINE	Undissolved	1-5

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes. Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams, whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas. Species such as the creeper are considered habitat generalists; thriving in streams, rivers, lakes and ponds. Species such as tidewater mucket and eastern pondmussel are often found in areas of tidal freshwater. All of the above mentioned aquatic habitats are reflected in the Landscape Project stream layer.

For Stream/River associated species, stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2024), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 10 km of each other, these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species.

1. If two occurrences are within 10 km length of streamline, the entire streamline between these occurrences should be valued/included.
Measure from the edge of the SOA polygon (for SF points, lines, and polygons).
2. If a lake/pond is between two occurrences that are within 10 km of one another, exclude the lake/pond.
3. Lakes or ponds should be excluded unless the occurrence is in a lake or pond.
 - a. Lakes/ponds are barriers to upstream and downstream movement.
4. For a single occurrence (without another occurrence within 10 km) or on the most upstream or downstream occurrence, value the stream centerline for that occurrence 0.75 km upstream and downstream from the occurrence, unless there is a barrier to upstream or downstream movement (lake/pond). Intersect the SOA with the stream centerlines and make the 0.75 km measurement from the edges of the SOA.
5. River/stream/tributaries that are connected to a river/stream/tributary between two occurrences should be included up to 0.75 km unless there is a barrier to upstream movement (lake/pond).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and larger waterbodies did not always intersect the centerline of the water feature. This also often happens as a result of changes in stream basemaps with mapping updates that alter the mapped stream location. In these cases, it was therefore necessary to select segments manually and designate them as habitat based on proximity of the occurrence. Dam mapping was not used as a barrier to mussel habitat mapping due to the large number of inaccuracies in the mapping data with many mapped dam features that longer exist or the many dams of such a small size and impact that they would not serve as a barrier to fish movement.

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6. Strayer, D.L., and K.J. Jirka. 1997. The pearly mussels of New York state. New York State Museum Memoir 26. The University of the State of New York. 113 pp. + figures

* ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Yellow Lampmussel *BIOPID* 253 *REGION* Statewide *PATCH TYPE* Stream Centerline

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
8888	STREAM CENTERLINE	Undissolved	<i>1-5</i>

Land Use - Land Cover Selection and Patch Type Rationale

Freshwater mussels occur in a variety of permanent aquatic habitats such as streams, rivers and lakes. Some freshwater mussel species, such as the yellow lampmussel, prefer rivers and larger streams, whereas other species (e.g. green floater) prefer small creeks, pools, eddies and other calm water areas. Species such as the creeper are considered habitat generalists; thriving in streams, rivers, lakes and ponds. Species such as tidewater mucket and eastern pondmussel are often found in areas of tidal freshwater. All of the above mentioned aquatic habitats are reflected in the Landscape Project stream layer.

For Stream/River associated species, stream segments intersected by a freshwater mussel SOA, were valued for that SOA. All valued streams were buffered by 0.75 km upstream and downstream. The 0.75 km distance was chosen as a conservative buffer estimate and based on mapping guidelines developed by NatureServe (2024), which rely largely on scientific evidence pertaining to distance of larval transport by host fishes. NatureServe guidelines state that if there are two occurrences within 10 km of each other, these occurrences should be considered as part of the same local population. In cases where stream buffers of separate occurrences of the same species met, either upstream or downstream, the stream segments between those occurrences were also valued for that species.

1. If two occurrences are within 10 km length of streamline, the entire streamline between these occurrences should be valued/included.
Measure from the edge of the SOA polygon (for SF points, lines, and polygons).
2. If a lake/pond is between two occurrences that are within 10 km of one another, exclude the lake/pond.
3. Lakes or ponds should be excluded unless the occurrence is in a lake or pond.
 - a. Lakes/ponds are barriers to upstream and downstream movement.
4. For a single occurrence (without another occurrence within 10 km) or on the most upstream or downstream occurrence, value the stream centerline for that occurrence 0.75 km upstream and downstream from the occurrence, unless there is a barrier to upstream or downstream movement (lake/pond). Intersect the SOA with the stream centerlines and make the 0.75 km measurement from the edges of the SOA.
5. River/stream/tributaries that are connected to a river/stream/tributary between two occurrences should be included up to 0.75 km unless there is a barrier to upstream movement (lake/pond).

Since stream centerline data were used to represent habitat, mussel SOA data that occurred in wider streams, rivers and larger waterbodies did not always intersect the centerline of the water feature. This also often happens as a result of changes in stream basemaps with mapping updates that alter the mapped stream location. In these cases, it was therefore necessary to select segments manually and designate them as habitat based on proximity of the occurrence. Dam mapping was not used as a barrier to mussel habitat mapping due to the large number of inaccuracies in the mapping data with many mapped dam features that longer exist or the many dams of such a small size and impact that they would not serve as a barrier to fish movement.

Literature Citations

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 3. Lindenmayer, M., Juanes, F. and M. McGinley. 2009. "Freshwater mussels in North America – factors affecting their endangerment and extinction.":http://www.eoearth.org/article/Freshwater_mussels_in_North_America_factors_affecting_their_endangerment_and_extinction
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 6. Strayer, D.L., and K.J. Jirka. 1997. The pearly mussels of New York state. New York State Museum Memoir 26. The University of the State of New York. 113 pp. + figures
- ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Acadian Hairstreak

BIOPID 291

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-4, *</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-4, *</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-4, *</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-4, *</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-4, *</i>
1800	RECREATIONAL LAND	Undissolved	<i>1-4, *</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-4, *</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-4, *</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-4, *</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-4, *</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-4, *</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-4, *</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-4, *</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-4, *</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-4, *</i>

4230	PLANTATION	Undissolved	<i>1-4,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-4,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-4,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-4,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-4,*</i>

6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
7100	BEACHES	Undissolved	<i>1-4,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-4,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-4,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-4,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-4,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Acadian Hairstreak is a species of woodlands and forests generally in shrubby riparian or wetland areas with shrubby willows. Adjacent fields, edges, glades and other habitat types are important areas for finding native flowers for nectaring.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Allegheny River Cruiser

BIOPID 136

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Allegheny River Cruiser

BIOPID 137

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-13,*
1419	BRIDGE OVER WATER	Undissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Undissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-13,*
2400	OTHER AGRICULTURE	Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Arrowhead Spiketail

BIOPID 98

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent Undissolved	1-8,*
1419	BRIDGE OVER WATER	Undissolved	1-8,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-8,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-8,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-8,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	1-8,*
1711	CEMETERY ON WETLAND	Adjacent Undissolved	1-8,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	1-8,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	1-8,*
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	1-8,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-8,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-8,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent Undissolved	1-8,*
2300	CONFINED FEEDING OPERATIONS	Adjacent Undissolved	1-8,*
2400	OTHER AGRICULTURE	Adjacent Undissolved	1-8,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4230	PLANTATION	Undissolved	<i>1-8,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-8,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-8,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent Undissolved	<i>1-8,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-8,*</i>
5200	NATURAL LAKES	Adjacent Undissolved	<i>1-8,*</i>
5300	ARTIFICIAL LAKES	Adjacent Undissolved	<i>1-8,*</i>
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	<i>1-8,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-8,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-8,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
7100	BEACHES	Adjacent Undissolved	<i>1-8,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent Undissolved	<i>1-8,*</i>
7300	EXTRACTIVE MINING	Adjacent Undissolved	<i>1-8,*</i>
7400	ALTERED LANDS	Adjacent Undissolved	<i>1-8,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
7500	TRANSITIONAL AREAS	Adjacent Undissolved	<i>1-8,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent Undissolved	<i>1-8,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and pupae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Arrowhead Spiketail

BIOPID 99

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-8,*
1419	BRIDGE OVER WATER	Undissolved	1-8,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-8,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-8,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-8,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-8,*
1711	CEMETERY ON WETLAND	Undissolved	1-8,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-8,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-8,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-8,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-8,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-8,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-8,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-8,*
2400	OTHER AGRICULTURE	Undissolved	1-8,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4230	PLANTATION	Undissolved	<i>1-8,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-8,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-8,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-8,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-8,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-8,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-8,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-8,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-8,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-8,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
7100	BEACHES	Undissolved	<i>1-8,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-8,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-8,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-8,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-8,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-8,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Baltimore Checkerspot

BIOPID 303

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-4,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-4,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-4,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-4,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-4,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-4,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-4,*</i>
1800	RECREATIONAL LAND	Undissolved	<i>1-4,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-4,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-4,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-4,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-4,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-4,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-4,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>

4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4230	PLANTATION	Undissolved	<i>1-4,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-4,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-4,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-4,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-4,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
7100	BEACHES	Undissolved	<i>1-4,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-4,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-4,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-4,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-4,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Baltimore Checkerspot is a species of wet meadows and upland fields with turtleheads which are their early instar larval food plant. Late instar larvae feed on a variety of plant species. They will use a wide range of flowering plants and adjacent habitats for nectaring.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

Literature Citations

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 2. Glassberg, J. 2017. A Swift Guide to Butterflies of North America. Princeton University Press, Princeton, NY.
 3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.
 4. NatureServe. 2023. NatureServe Network Biodiversity Location Data accessed through NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available <https://explorer.natureserve.org/>. (Accessed: August 31, 2023).
- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Baltimore Checkerspot

BIOPID 304

REGION Statewide

PATCH TYPE CP.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	<i>1-4,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1-4,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	<i>1-4,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1-4,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1-4,*</i>
1711	CEMETERY ON WETLAND	Dissolved	<i>1-4,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	<i>1-4,*</i>
1800	RECREATIONAL LAND	Dissolved	<i>1-4,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	<i>1-4,*</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1-4,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1-4,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1-4,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1-4,*</i>
2400	OTHER AGRICULTURE	Dissolved	<i>1-4,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4230	PLANTATION	Dissolved	<i>1-4,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1-4,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	<i>1-4,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1-4,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1-4,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1-4,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>1-4,*</i>
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	<i>1-4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	<i>1-4,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Adjacent Undissolved	<i>1-4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-4,*</i>

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-4,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-4,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-4,*</i>
7100	BEACHES	Dissolved	<i>1-4,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-4,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-4,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-4,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-4,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Baltimore Checkerspot is a species of wet meadows and upland fields with turtleheads which are their early instar larval food plant. Late instar larvae feed on a variety of plant species. They will use a wide range of flowering plants and adjacent habitats for nectaring.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
 2. Glassberg, J. 2017. A Swift Guide to Butterflies of North America. Princeton University Press, Princeton, NY.
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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Banner Clubtail

BIOPID 134

REGION Statewide

PATCH TYPE Cardinal-Proximate *

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Dissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Dissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Banner Clubtail

BIOPID 135

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Bronze Copper

BIOPID 30

REGION Statewide

PATCH TYPE Cardinal-Proximate

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	<i>1-6,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1-6,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	<i>1-6,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1-6,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1-6,*</i>
1711	CEMETERY ON WETLAND	Dissolved	<i>1-6,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	<i>1-6,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	<i>1-6,*</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1-6,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1-6,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1-6,*</i>
2400	OTHER AGRICULTURE	Dissolved	<i>1-6,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-6,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-6,*</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-6,*</i>
4230	PLANTATION	Dissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>1-6,*</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	<i>1-6,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-6,*</i>

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
7100	BEACHES	Dissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
7440	DISTURBED TIDAL WETLANDS	Dissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in fields, marshes, meadows, fens, and along the edges of ponds and streams. It will often travel to adjacent uplands for nectar (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Bronze Copper

BIOPID 31

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-6,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-6,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-6,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-6,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-6,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-6,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-6,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-6,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-6,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-6,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-6,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-6,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4230	PLANTATION	Undissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
7100	BEACHES	Undissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in fields, marshes, meadows, fens, and along the edges of ponds and streams. It will often travel to adjacent uplands for nectar (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
 2. Glassberg, J. 1999. Butterflies through binoculars, the east. Oxford University Press, New York, NY.
 3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Brook Snaketail

BIOPID 122

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Brook Snaketail

BIOPID 123

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-13,*
1419	BRIDGE OVER WATER	Undissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Undissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-13,*
2400	OTHER AGRICULTURE	Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Brush-tipped Emerald

BIOPID 146

REGION Statewide

PATCH TYPE Cardinal-Proximate *

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Dissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Dissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Brush-tipped Emerald

BIOPID 147

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Checkered White

BIOPID 28

REGION Statewide

PATCH TYPE Cardinal-Proximate

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	<i>1-6,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1-6,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	<i>1-6,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1-6,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1-6,*</i>
1711	CEMETERY ON WETLAND	Dissolved	<i>1-6,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	<i>1-6,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	<i>1-6,*</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1-6,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1-6,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1-6,*</i>
2400	OTHER AGRICULTURE	Dissolved	<i>1-6,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-6,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-6,*</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4230	PLANTATION	Dissolved	1-6,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-6,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-6,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-6,*
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	1-6,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-6,*
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6221	ATLANTIC WHITE CEDAR SWAMP	Adjacent Undissolved	1-6,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1-6,*

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
7100	BEACHES	Dissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in disturbed open areas, grasslands, savannas, successional fields, and open/grassy woodlands and scrub/shrub lands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Checkered White

BIOPID 29

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-6,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-6,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-6,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-6,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-6,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-6,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-6,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-6,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-6,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-6,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-6,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-6,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4230	PLANTATION	Undissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>

6240	HERBACEOUS WETLANDS	Undissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
7100	BEACHES	Undissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in disturbed open areas, grasslands, savannas, successional fields, and open/grassy woodlands and scrub/shrub lands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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 2. Glassberg, J. 1999. Butterflies through binoculars, the east. Oxford University Press, New York, NY.
 3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.
 4. NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1 NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Cobra Clubtail

BIOPID 114

REGION Statewide

PATCH TYPE Cardinal-Proximate *

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Dissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Dissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Cobra Clubtail

BIOPID 115

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4230	PLANTATION	Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-13*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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5. Corser, J. D. 2010. Status and Ecology of a Rare Gomphid Dragonfly at the Northern Extent of its Range. Northeastern Naturalist, 17(2):341-345.
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 13. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Common Roadside-Skipper

BIOPID 295

REGION Statewide

PATCH TYPE CP.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	<i>1-4,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1-4,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	<i>1-4,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1-4,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1-4,*</i>
1711	CEMETERY ON WETLAND	Dissolved	<i>1-4,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	<i>1-4,*</i>
1800	RECREATIONAL LAND	Dissolved	<i>1-4,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	<i>1-4,*</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1-4,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1-4,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1-4,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1-4,*</i>
2400	OTHER AGRICULTURE	Dissolved	<i>1-4,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4230	PLANTATION	Dissolved	<i>1-4,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1-4,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	<i>1-4,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1-4,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1-4,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1-4,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>1-4,*</i>
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	<i>1-4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	<i>1-4,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1-4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-4,*</i>

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-4,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-4,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-4,*</i>
7100	BEACHES	Dissolved	<i>1-4,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-4,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-4,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-4,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-4,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Common Roadside-Skipper is a species of upland fields, grasslands, forest gaps and glades and other open disturbed areas with native grasses which are its larval host plants. This species will use a variety of native wildflowers and habitats for nectaring.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Compton Tortoiseshell

BIOPID 298

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1
1800	RECREATIONAL LAND	Undissolved	1
2100	CROPLAND AND PASTURELAND	Undissolved	1
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1
2400	OTHER AGRICULTURE	Undissolved	1
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1

4230	PLANTATION	Undissolved	<i>1</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1</i>

6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1</i>
7100	BEACHES	Undissolved	<i>1</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1</i>
7400	ALTERED LANDS	Undissolved	<i>1</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Compton Tortoiseshell is a woodland species and associated with birches, poplars and willows which are its larval host plants.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

Literature Citations

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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Coppery Emerald

BIOPID 133

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-13,*
1419	BRIDGE OVER WATER	Undissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Undissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-13,*
2400	OTHER AGRICULTURE	Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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7. Hunt, P.D., Blust, M. and F. Morrison. 2010. Lotic Odonata of the Connecticut River in New Hampshire and Vermont. Northeastern Naturalist, 17(2):175-188.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Crimson-ringed Whiteface

BIOPID 156

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Crimson-ringed Whiteface

BIOPID 157

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-4,6-10*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-4,6-10*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-4,6-10*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-4,6-10*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-4,6-10*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-4,6-10*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-4,6-10*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-4,6-10*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-4,6-10*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-4,6-10*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-4,6-10*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-4,6-10*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-4,6-10*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-4,6-10*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-4,6-10*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-4,6-10*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-4,6-10*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-4,6-10*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-4,6-10*</i>
4230	PLANTATION	Undissolved	<i>1-4,6-10*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-4,6-10*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,6-10*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-4,6-10*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,6-10*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-4,6-10*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-4,6-10*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,6-10*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,6-10*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,6-10*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-4,6-10*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-4,6-10*</i>
5200	NATURAL LAKES	Undissolved	<i>1-4,6-10*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-4,6-10*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-4,6-10*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-4,6-10*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-4,6-10*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,6-10*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,6-10*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,6-10*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,6-10*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-4,6-10*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-4,6-10*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,6-10*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,6-10*</i>
7100	BEACHES	Undissolved	<i>1-4,6-10*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-4,6-10*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-4,6-10*</i>
7400	ALTERED LANDS	Undissolved	<i>1-4,6-10*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-4,6-10*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-4,6-10*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-4,6-10*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Limited Extent is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Dotted Skipper

BIOPID 16

REGION Statewide

PATCH TYPE CP.1 Cardinal-
Proximate

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	<i>1-6,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1-6,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	<i>1-6,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1-6,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	<i>1-6,*</i>
1711	CEMETERY ON WETLAND	Dissolved	<i>1-6,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	<i>1-6,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	<i>1-6,*</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1-6,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1-6,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1-6,*</i>
2400	OTHER AGRICULTURE	Dissolved	<i>1-6,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-6,*</i>

4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-6,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-6,*</i>
4230	PLANTATION	Dissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	<i>1-6,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Adjacent Undissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-6,*</i>

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
7100	BEACHES	Dissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in dry, shortgrass prairies, successional fields, pine barrens, meadows, reedgrass savannahs, woodlands, and scrub/shrub land. Dotted skipper utilizes open habitats for breeding and nectaring but also depends on forests for shelter during inclement or hot weather, dispersal, and nectaring (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and non-breeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Dotted Skipper

BIOPID 17

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-6,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-6,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-6,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-6,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-6,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-6,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-6,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-6,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-6,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-6,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-6,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-6,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4230	PLANTATION	Undissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
7100	BEACHES	Undissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in dry, shortgrass prairies, successional fields, pine barrens, meadows, reedgrass savannahs, woodlands, and scrub/shrub land. Dotted skipper utilizes open habitats for breeding and nectaring but also depends on forests for shelter during inclement or hot weather, dispersal, and nectaring (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and non-breeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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 3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.
 4. NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
 5. Opler, Paul A., Kelly Lotts, and Thomas Naberhaus, coordinators. 2011. Butterflies and Moths of North America. Bozeman, MT: Big Sky Institute. <http://www.butterfliesandmoths.org/> (Version 06302011).
 6. Opler, P. A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin Company, New York, NY.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Dusted Skipper

BIOPID 302

REGION Statewide

PATCH TYPE CP.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-4,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-4,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-4,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-4,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-4,*
1711	CEMETERY ON WETLAND	Dissolved	1-4,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-4,*
1800	RECREATIONAL LAND	Dissolved	1-4,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-4,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-4,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-4,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-4,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-4,*
2400	OTHER AGRICULTURE	Dissolved	1-4,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4230	PLANTATION	Dissolved	<i>1-4,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>1-4,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	<i>1-4,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1-4,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	<i>1-4,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1-4,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1-4,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1-4,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>1-4,*</i>
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	<i>1-4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	<i>1-4,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1-4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-4,*</i>

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-4,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-4,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-4,*</i>
7100	BEACHES	Dissolved	<i>1-4,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-4,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-4,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-4,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-4,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Dusted Skipper is a species of upland fields, grasslands, forest gaps and glades and other open disturbed areas with native grasses which are its larval host plants. This species will utilize a variety of native wildflowers and habitats for nectaring.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
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 3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.
 4. NatureServe. 2023. NatureServe Network Biodiversity Location Data accessed through NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available <https://explorer.natureserve.org/>. (Accessed: August 31, 2023).
- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Eastern Arogos Skipper

BIOPID 11

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-8,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-8,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-8,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-8,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-8,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-8,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-8,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-8,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-8,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-8,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-8,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-8,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4230	PLANTATION	Undissolved	<i>1-8,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-8,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-8,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-8,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-8,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-8,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-8,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
7100	BEACHES	Undissolved	<i>1-8,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-8,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-8,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-8,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-8,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-8,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In northern New Jersey, this species occurs mostly in grassy patches and successional dry fields while, in southern New Jersey, this species occurs mostly on reedgrass savannas and meadows. The northern New Jersey populations are known to use little bluestem (*Schizachyrium scoparius*) as a primary foodplant and southern New Jersey populations are known to use Pinebarrens Reedgrass (*Calamovilfa brevipilis*) as a primary foodplant (NatureServe 2010).

Arogos Skipper utilizes open habitats for breeding and nectaring but also depends on forest edges for shelter during inclement or hot weather and nectaring (NatureServe 2010). This species is known to feed on a variety of grass species throughout its range and presumably could use other foodplants in New Jersey. The classes selected represent habitats suitable for use by this species for both breeding and nonbreeding activities in relation to the occurrence. Many species of lepidoptera will use a wide variety of habitat types for nectaring, shelter and dispersal purposes that would not be suitable for breeding habitat.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
2. Glassberg, J. 1999. Butterflies through binoculars, the east. Oxford University Press, New York, NY.
3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.
4. Heitzman, R. 1966. The Life history of Atrytone Arogos (Hesperiidae). Journal of The Lepidopterists' Society, 20(3): 177-181.
5. Minno, M. C. and M. Minno. 2006. Conservation of the Arogos Skipper, Atrytone Arogos Arogos (Lepidoptera: Hesperiidae) in Florida. Pages 219-222 in Reed F. Noss, editor. Land of Fire and Water; The Florida Dry Prairie Ecosystem. Proceedings of the Florida Dry Prairie Conference.
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 8. Opler, P. A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin Company, New York, NY.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Eastern Arogos Skipper

BIOPID 95

REGION Statewide

PATCH TYPE Cardinal-Proximate

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-8,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-8,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-8,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-8,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-8,*
1711	CEMETERY ON WETLAND	Dissolved	1-8,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-8,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-8,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-8,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-8,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-8,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-8,*
2400	OTHER AGRICULTURE	Dissolved	1-8,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-8,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-8,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-8,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-8,*
4230	PLANTATION	Dissolved	1-8,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-8,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-8,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-8,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-8,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-8,*
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	1-8,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-8,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-8,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-8,*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-8,*
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	1-8,*
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	1-8,*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1-8,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-8,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-8,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1-8,*

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-8,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-8,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-8,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-8,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-8,*</i>
7100	BEACHES	Dissolved	<i>1-8,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-8,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-8,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-8,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-8,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-8,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-8,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In northern New Jersey, this species occurs mostly in grassy patches and successional dry fields. In southern New Jersey, this species occurs mostly on reedgrass savannas and meadows. This species will often travel hundreds of meters to several kilometers in order to reach nectar sources or colonize new locations. The northern New Jersey populations are known to use little bluestem (*Schizachyrium scoparius*) as a primary foodplant. The southern New Jersey populations are known to use Pinebarrens Reedgrass (*Calamovilfa brevipilis*) as a primary foodplant (NatureServe 2010).

Arogos Skipper utilizes open grassy habitats for breeding and nectaring but also depends on forest edges for shelter during inclement or hot weather and for additional nectaring sources (NatureServe 2010). This species is known to feed on a variety of grass species throughout its range and presumably could use other foodplants in New Jersey. Many species of lepidoptera will use a wide variety of habitat types for nectaring, shelter and dispersal purposes that would not be suitable for breeding habitat.

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
2. Glassberg, J. 1999. Butterflies through binoculars, the east. Oxford University Press, New York, NY.
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8. Opler, P. A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin Company, New York, NY.

* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Eastern Beach Tiger Beetle

BIOPID 244

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-3,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-3,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-3,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-3,*
1711	CEMETERY ON WETLAND	Undissolved	1-3,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-3,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-3,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-3,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-3,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-3,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-3,*
2400	OTHER AGRICULTURE	Undissolved	1-3,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-3,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-3,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-3,*

4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-3,*</i>
4230	PLANTATION	Undissolved	<i>1-3,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-3,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-3,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-3,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-3,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-3,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-3,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-3,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-3,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-3,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-3,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-3,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-3,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-3,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-3,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-3,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-3,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-3,*</i>

6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-3,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-3,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-3,*</i>
7100	BEACHES	Undissolved	<i>1-3,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-3,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-3,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-3,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-3,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-3,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-3,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This species of tiger beetle is restricted to sandy beach and dune habitat along ocean and bay shorelines. The larvae inhabit burrows between the high tide line and the dune line. Adults forage widely over the beach areas but are found primarily close to the water's edge. They will often disperse over several kilometers to colonize new habitat (Pearson, D.L., Knisley, C.B., and C.J. Kazilek. 2006). Land Use/Land Cover patches were selected to represent areas that would be suitable for larvae to inhabit and for the adults to forage and disperse.

Patch type Limited Extent was used to value habitat limited to the immediate area surrounding known occurrences of this species.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
 2. Hill, J.N. and C.B. Knisley. 1994. Northeastern Beach Tiger Beetle (*Cincindela dorsalis dorsalis* Say) Recovery Plan. U.S. Fish and Wildlife Service, Hadley, Massachusetts.
 3. Pearson, D.L., Knisley, C.B., and C.J. Kazilek. 2006. A Field Guide to the Tiger Beetles of the United States and Canada. Oxford University Press, New York, NY.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Eyed Brown

BIOPID 305

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-4,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-4,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-4,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-4,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-4,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-4,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-4,*</i>
1800	RECREATIONAL LAND	Undissolved	<i>1-4,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-4,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-4,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-4,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-4,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-4,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-4,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>

4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4230	PLANTATION	Undissolved	<i>1-4,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-4,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-4,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-4,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-4,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
7100	BEACHES	Undissolved	<i>1-4,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-4,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-4,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-4,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-4,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Eyed Brown is a species of large, open wet meadows and marshes with sedges. Their larval host plants are a variety of sedge species. They will use a wide range of flowering plants and adjacent habitats for nectaring.

Patch types Limited Extent and Cardinal Proximate are used for any records for this species. Due to the wide range of habitats that are important to this species, these patch types are used to value suitable habitats that intersect with observed occurrences of this species.

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1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Forcipate Emerald

BIOPID 153

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-13,*
1419	BRIDGE OVER WATER	Undissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Undissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-13,*
2400	OTHER AGRICULTURE	Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Frosted Elfin

BIOPID 22

REGION Statewide

PATCH TYPE Cardinal-Proximate

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-7,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-7,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-7,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-7,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-7,*
1711	CEMETERY ON WETLAND	Dissolved	1-7,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-7,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-7,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-7,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-7,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-7,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-7,*
2400	OTHER AGRICULTURE	Dissolved	1-7,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-7,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-7,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-7,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-7,*
4230	PLANTATION	Dissolved	1-7,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-7,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-7,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-7,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-7,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-7,*
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	1-7,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-7,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-7,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-7,*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-7,*
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	1-7,*
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	1-7,*
6221	ATLANTIC WHITE CEDAR SWAMP	Adjacent Undissolved	1-7,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-7,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-7,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1-7,*

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-7,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-7,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-7,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-7,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-7,*</i>
7100	BEACHES	Dissolved	<i>1-7,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-7,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-7,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-7,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-7,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-7,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-7,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in open/barren habitat, grasslands, savannahs, successional fields, scrub/shrub lands and open woodlands and forest edges (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

Literature Citations

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Frosted Elfin

BIOPID 23

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-7,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-7,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-7,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-7,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-7,*
1711	CEMETERY ON WETLAND	Undissolved	1-7,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-7,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-7,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-7,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-7,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-7,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-7,*
2400	OTHER AGRICULTURE	Undissolved	1-7,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-7,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-7,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-7,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-7,*</i>
4230	PLANTATION	Undissolved	<i>1-7,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-7,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-7,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-7,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-7,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-7,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-7,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-7,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-7,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-7,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-7,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-7,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-7,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-7,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-7,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-7,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-7,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-7,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-7,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-7,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-7,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-7,*</i>
7100	BEACHES	Undissolved	<i>1-7,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-7,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-7,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-7,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-7,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-7,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-7,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in open/barren habitat, grasslands, savannahs, successional fields, scrub/shrub lands and open woodlands and edges (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. Albanese, G., P. D. Vickery, P. R. Sievert. 2008. Microhabitat use by larvae and females of a rare barrens butterfly, frosted elfin (*Callophrys irus*). Journal Insect Conservation, 12:603-615.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Georgia Satyr

BIOPID 12

REGION Statewide

PATCH TYPE Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-6,*
1711	CEMETERY ON WETLAND	Dissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-6,*
2400	OTHER AGRICULTURE	Dissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4230	PLANTATION	Dissolved	1-6,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-6,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-6,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-6,*
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	1-6,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-6,*
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1-6,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1-6,*

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
7100	BEACHES	Dissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in marshes, meadows, fens, and along the edges of pond and streams. It will often travel to adjacent uplands for shelter and dispersal (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

Literature Citations

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Georgia Satyr

BIOPID 13

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-6,*
1711	CEMETERY ON WETLAND	Undissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-6,*
2400	OTHER AGRICULTURE	Undissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4230	PLANTATION	Undissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
7100	BEACHES	Undissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in marshes, meadows, fens, and along the edges of ponds and streams. It will often travel to adjacent uplands for shelter and dispersal (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
 2. Glassberg, J. 1999. Butterflies through binoculars, the east. Oxford University Press, New York, NY.
 3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.
 4. NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
 5. Opler, Paul A., Kelly Lotts, and Thomas Naberhaus, coordinators. 2011. Butterflies and Moths of North America. Bozeman, MT: Big Sky Institute. <http://www.butterfliesandmoths.org/> (Version 06302011).
 6. Opler, P. A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin Company, New York, NY.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Golden-winged Skimmer

BIOPID 104

REGION Statewide

PATCH TYPE Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-10,*
1419	BRIDGE OVER WATER	Adjacent/Riparian Undissolved	1-10,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-10,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-10,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-10,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-10,*
1711	CEMETERY ON WETLAND	Adjacent/Riparian Undissolved	1-10,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-10,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-10,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-10,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-10,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-10,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent/Riparian Undissolved	1-10,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-10,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-10,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4230	PLANTATION	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	<i>1-10,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-10,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-10,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-10,*</i>
6120	FRESHWATER TIDAL MARSHES	Adjacent/Riparian Undissolved	<i>1-10,*</i>

6210	DECIDUOUS WOODED WETLANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6220	CONIFEROUS WOODED WETLANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-10,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-10,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-10,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7100	BEACHES	Undissolved	<i>1-10,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
 2. Barlow, A.E., Golden, D.M., and J. Bangma. 2009. Field Guide to Dragonflies and Damselflies of New Jersey. Flemington, NJ: PSI.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Golden-winged Skimmer

BIOPID 105

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-10,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-10,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-10,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-10,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-10,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-10,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-10,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-10,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-10,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-10,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-10,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-10,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-10,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-10,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-10,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4230	PLANTATION	Undissolved	<i>1-10,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-10,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-10,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-10,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-10,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-10,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-10,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-10,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-10,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-10,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-10,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-10,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-10,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
7100	BEACHES	Undissolved	<i>1-10,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-10,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-10,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-10,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-10,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-10,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-10,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/ pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
 2. Barlow, A.E., Golden, D.M., and J. Bangma. 2009. Field Guide to Dragonflies and Damselflies of New Jersey. Flemington, NJ: PSI.
 3. Bried, J. T. and G. N. Ervin. 2006. Abundance Patterns of Dragonflies Along a Wetland Buffer. Wetlands, 26(3): 878-883.
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 8. Nikula, B., Ryan, J.L., and M.R. Burne. 2007. A Field Guide to the Dragonflies and Damselflies of Massachusetts 2nd ed. Westborough, MA: Massachusetts Division of Fisheries and Wildlife-Natural Heritage & Endangered Species Program.
 9. NJOdes. 2006. NJOdes-The Dragonflies and Damselflies of New Jersey. Accessed June 30, 2011. Available www.njodes.com.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Gray Comma

BIOPID 296

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-4,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-4,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-4,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-4,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-4,*
1800	RECREATIONAL LAND	Undissolved	1-4,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-4,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-4,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-4,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-4,*
2400	OTHER AGRICULTURE	Undissolved	1-4,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-4,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-4,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-4,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-4,*

4230	PLANTATION	Undissolved	<i>1-4,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-4,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-4,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-4,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-4,*</i>

6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
7100	BEACHES	Undissolved	<i>1-4,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-4,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-4,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-4,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-4,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Gray Comma is a species of woodlands and field edges and glades with gooseberries which are their larval food plant.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
 2. Glassberg, J. 2017. A Swift Guide to Butterflies of North America. Princeton University Press, Princeton, NY.
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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Gray Petaltail

BIOPID 91

REGION Statewide

PATCH TYPE CP.3 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent Undissolved	<i>1-8,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-8,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-8,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-8,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-8,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	<i>1-8,*</i>
1711	CEMETERY ON WETLAND	Adjacent Undissolved	<i>1-8,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	<i>1-8,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	<i>1-8,*</i>
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	<i>1-8,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-8,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent Undissolved	<i>1-8,*</i>
2300	CONFINED FEEDING OPERATIONS	Adjacent Undissolved	<i>1-8,*</i>

2400	OTHER AGRICULTURE	Adjacent Undissolved	<i>1-8,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4230	PLANTATION	Undissolved	<i>1-8,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-8,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-8,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent Undissolved	<i>1-8,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-8,*</i>
5200	NATURAL LAKES	Adjacent Undissolved	<i>1-8,*</i>
5300	ARTIFICIAL LAKES	Adjacent Undissolved	<i>1-8,*</i>

6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	<i>1-8,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-8,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-8,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
7100	BEACHES	Adjacent Undissolved	<i>1-8,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent Undissolved	<i>1-8,*</i>
7300	EXTRACTIVE MINING	Adjacent Undissolved	<i>1-8,*</i>
7400	ALTERED LANDS	Adjacent Undissolved	<i>1-8,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
7500	TRANSITIONAL AREAS	Adjacent Undissolved	<i>1-8,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent Undissolved	<i>1-8,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
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 3. Corser, J. D. 2010. Status and Ecology of a Rare Gomphid Dragonfly at the Northern Extent of its Range. Northeastern Naturalist, 17(2):341-345.
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 8. NJOdes. 2006. NJOdes-The Dragonflies and Damselflies of New Jersey. Accessed June 30, 2011. Available www.njodes.com.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Gray Petaltail

BIOPID 92

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-8,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-8,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-8,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-8,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-8,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-8,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-8,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-8,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-8,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-8,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-8,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-8,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-8,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-8,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4230	PLANTATION	Undissolved	<i>1-8,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-8,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-8,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-8,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-8,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-8,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-8,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-8,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-8,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-8,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
7100	BEACHES	Undissolved	<i>1-8,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-8,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-8,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-8,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-8,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-8,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

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 6. Needham, J.G., M.J. Westfall, and M.L. May. 2000. Dragonflies of North America, revised edition. Gainesville, FL: Scientific Publishers.
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 8. NJOdes. 2006. NJOdes-The Dragonflies and Damselflies of New Jersey. Accessed June 30, 2011. Available www.njodes.com.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Green-faced Clubtail

BIOPID 112

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4230	PLANTATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Dissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
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3. Biber, E. 2002. Habitat Analysis of a Rare Dragonfly (*Williamsonia lintneri*) in Rhode Island. Northern Naturalist, 9(3):341-352.
4. Bried, J. T. and G. N. Ervin. 2006. Abundance Patterns of Dragonflies Along a Wetland Buffer. Wetlands, 26(3): 878-883.
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7. Hunt, P.D., Blust, M. and F. Morrison. 2010. Lotic Odonata of the Connecticut River in New Hampshire and Vermont. Northeastern Naturalist, 17(2):175-188.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Green-faced Clubtail

BIOPID 113

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4230	PLANTATION	Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Harpoon Clubtail

BIOPID 126

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Harpoon Clubtail

BIOPID 127

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-13,*
1419	BRIDGE OVER WATER	Undissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Undissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-13,*
2400	OTHER AGRICULTURE	Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4230	PLANTATION	Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Harris's Checkerspot

BIOPID 20

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-6,*
1711	CEMETERY ON WETLAND	Undissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-6,*
2400	OTHER AGRICULTURE	Undissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4230	PLANTATION	Undissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
7100	BEACHES	Undissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in a wide variety of open habitats. It is found in scrub/shrub lands and forest edge areas, grasslands, bogs, marshes, and meadows (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for all records relating to this species and values any habitat suitable for this species to complete its life history, including areas suitable for breeding, nectaring, resting, and dispersal.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
 2. Glassberg, J. 1999. Butterflies through binoculars, the east. Oxford University Press, New York, NY.
 3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.
 4. NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
 5. Opler, Paul A., Kelly Lotts, and Thomas Naberhaus, coordinators. 2011. Butterflies and Moths of North America. Bozeman, MT: Big Sky Institute. <http://www.butterfliesandmoths.org/> (Version 06302011).
 6. Opler, P. A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin Company, New York, NY.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hessel's Hairstreak

BIOPID 176

REGION Statewide

PATCH TYPE Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent Undissolved	1-6,*
1419	BRIDGE OVER WATER	Adjacent Undissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent Undissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent Undissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	1-6,*
1711	CEMETERY ON WETLAND	Adjacent Undissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent Undissolved	1-6,*
2400	OTHER AGRICULTURE	Adjacent Undissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*

4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4230	PLANTATION	Adjacent Undissolved	1-6,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent Undissolved	1-6,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent Undissolved	1-6,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	1-6,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent Undissolved	1-6,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent Undissolved	1-6,*
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	1-6,*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1-6,*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1-6,*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1-6,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Adjacent Undissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Adjacent Undissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Adjacent Undissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Adjacent Undissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent Undissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in Atlantic White Cedar wetlands and swamps as well as adjacent wetland and upland areas containing nectar sources (NatureServe 2010). Landuse-Landcover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

Literature Citations

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 4. NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
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 6. Opler, P. A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin Company, new York, NY.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hessel's Hairstreak

BIOPID 177

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-6,*
1711	CEMETERY ON WETLAND	Undissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-6,*
2400	OTHER AGRICULTURE	Undissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4230	PLANTATION	Undissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
7100	BEACHES	Undissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in Atlantic White Cedar wetlands and swamps as well as adjacent wetland and upland areas containing nectar sources (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. ENSP. 2010. Land-use/Land-cover Analysis for Species and their Feature Label components. Appendix IV.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hickory Hairstreak

BIOPID 299

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-4,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-4,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-4,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-4,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-4,*
1800	RECREATIONAL LAND	Undissolved	1-4,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-4,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-4,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-4,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-4,*
2400	OTHER AGRICULTURE	Undissolved	1-4,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-4,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-4,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-4,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-4,*

4230	PLANTATION	Undissolved	<i>1-4,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-4,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-4,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-4,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-4,*</i>

6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
7100	BEACHES	Undissolved	<i>1-4,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-4,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-4,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-4,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-4,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Hickory Hairstreak is a species of woodlands and forests with hickories which are its larval host plant. Adjacent fields, edges, glades and other habitat types are important areas for finding native flowers for nectaring.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hoary Elfin

BIOPID 24

REGION Statewide

PATCH TYPE Cardinal-Proximate

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-6,*
1711	CEMETERY ON WETLAND	Dissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-6,*
2400	OTHER AGRICULTURE	Dissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4230	PLANTATION	Dissolved	1-6,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-6,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-6,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-6,*
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	1-6,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-6,*
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1-6,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1-6,*

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
7100	BEACHES	Dissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in open/barren habitat, grasslands, savannahs, successional fields, scrub/shrub lands and open woodlands and forest edges (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

Literature Citations

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hudsonian Whiteface

BIOPID 154

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Hudsonian Whiteface

BIOPID 155

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-13,*
1419	BRIDGE OVER WATER	Undissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Undissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-13,*
2400	OTHER AGRICULTURE	Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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5. Corser, J. D. 2010. Status and Ecology of a Rare Gomphid Dragonfly at the Northern Extent of its Range. Northeastern Naturalist, 17(2):341-345.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Kennedy's Emerald

BIOPID 158

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	1-13,*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1-13,*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1-13,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-13,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-13,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1-13,*
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	1-13,*
6240	HERBACEOUS WETLANDS	Dissolved	1-13,*
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	1-13,*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	1-13,*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	1-13,*
7100	BEACHES	Dissolved	1-13,*
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	1-13,*
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	1-13,*
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	1-13,*
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	1-13,*
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	1-13,*
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	1-13,*

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Leonard's Skipper

BIOPID 89

REGION Statewide

PATCH TYPE Cardinal-Proximate

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-6,*
1711	CEMETERY ON WETLAND	Dissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-6,*
2400	OTHER AGRICULTURE	Dissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4230	PLANTATION	Dissolved	1-6,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-6,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-6,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-6,*
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	1-6,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-6,*
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1-6,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1-6,*

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
7100	BEACHES	Dissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in grasslands, savannas, successional fields, and open/grassy wood and scrub/shrub lands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

Literature Citations

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Leonard's Skipper

BIOPID 90

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-6,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-6,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-6,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-6,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-6,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-6,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-6,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-6,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-6,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-6,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-6,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-6,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4230	PLANTATION	Undissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
7100	BEACHES	Undissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in grasslands, savannas, successional fields, and open/grassy wood and scrub/shrub lands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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 3. Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: A Guide to their status, distribution, conservation, and appreciation. New Brunswick: Rutgers University Press.
 4. NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Maine Snaketail

BIOPID 128

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Maine Snaketail

BIOPID 129

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4230	PLANTATION	Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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5. Corser, J. D. 2010. Status and Ecology of a Rare Gomphid Dragonfly at the Northern Extent of its Range. Northeastern Naturalist, 17(2):341-345.
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 13. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Midland Clubtail

BIOPID 116

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Mitchell's Satyr

BIOPID 19

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-10,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-10,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-10,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-10,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-10,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-10,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-10,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-10,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-10,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-10,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-10,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-10,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-10,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4230	PLANTATION	Undissolved	<i>1-10,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-10,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-10,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-10,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-10,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-10,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-10,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-10,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-10,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
7100	BEACHES	Undissolved	<i>1-10,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-10,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-10,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-10,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-10,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-10,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-10,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in fen and sedge meadow complexes and wooded/scrub/shrub wetlands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for all records relating to this species and values any habitat suitable for this species to complete its life history, including areas suitable for breeding, nectaring, resting, and dispersal.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Monarch

BIOPID 307

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-5,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-5,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-5,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-5,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-5,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-5,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-5,*</i>
1800	RECREATIONAL LAND	Undissolved	<i>1-5,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-5,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-5,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-5,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-5,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-5,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-5,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-5,*</i>

4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-5,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-5,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-5,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-5,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-5,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-5,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Monarch utilizes a variety of habitat types in NJ including prairies and grasslands, agricultural lands, and backyard habitats. They use a wide range of flowering plants for nectaring and this is particularly important during migration. Their larvae feed on several species of milkweed plants that can be found in a variety of habitat types. Areas of forest and scrub shrub are often important for overnight roosting sites while on migration.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Myrina Fritillary

BIOPID 18

REGION Statewide

PATCH TYPE Cardinal-Proximate

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-6,*
1711	CEMETERY ON WETLAND	Dissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-6,*
2400	OTHER AGRICULTURE	Dissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4230	PLANTATION	Dissolved	1-6,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-6,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-6,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-6,*
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	1-6,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-6,*
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6221	ATLANTIC WHITE CEDAR SWAMP	Adjacent Undissolved	1-6,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1-6,*

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
7100	BEACHES	Dissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in wet meadows/savannahs, marshes, bogs, and scrub/shrub and wooded wetlands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Myrina Fritillary

BIOPID 88

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-6,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-6,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-6,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-6,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-6,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-6,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-6,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-6,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-6,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-6,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-6,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-6,*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4230	PLANTATION	Undissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
7100	BEACHES	Undissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs mostly in wet meadows/savannahs, marshes, bogs, and scrub/shrub and wooded wetlands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

New England Bluet

BIOPID 108

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-10,*
1419	BRIDGE OVER WATER	Adjacent/Riparian Undissolved	1-10,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-10,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-10,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-10,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-10,*
1711	CEMETERY ON WETLAND	Adjacent/Riparian Undissolved	1-10,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-10,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-10,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-10,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-10,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-10,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent/Riparian Undissolved	1-10,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-10,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-10,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4230	PLANTATION	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	<i>1-10,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-10,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-10,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-10,*</i>
6120	FRESHWATER TIDAL MARSHES	Adjacent/Riparian Undissolved	<i>1-10,*</i>

6210	DECIDUOUS WOODED WETLANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6220	CONIFEROUS WOODED WETLANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-10,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-10,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-10,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7100	BEACHES	Undissolved	<i>1-10,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

New England Bluet

BIOPID 109

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-10,*
1419	BRIDGE OVER WATER	Undissolved	1-10,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-10,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-10,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-10,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-10,*
1711	CEMETERY ON WETLAND	Undissolved	1-10,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-10,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-10,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-10,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-10,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-10,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-10,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-10,*
2400	OTHER AGRICULTURE	Undissolved	1-10,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4230	PLANTATION	Undissolved	<i>1-10,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-10,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-10,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-10,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-10,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-10,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-10,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-10,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-10,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-10,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-10,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-10,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-10,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
7100	BEACHES	Undissolved	<i>1-10,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-10,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-10,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-10,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-10,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-10,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-10,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/ pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Northern Metalmark

BIOPID 26

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-7,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-7,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-7,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-7,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-7,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-7,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-7,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-7,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-7,*
2400	OTHER AGRICULTURE	Undissolved	1-7,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-7,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-7,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-7,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-7,*
4230	PLANTATION	Undissolved	1-7,*

4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-7,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-7,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-7,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-7,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-7,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-7,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-7,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-7,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-7,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-7,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-7,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-7,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-7,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-7,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-7,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-7,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-7,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-7,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-7,*</i>

6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-7,*</i>
7100	BEACHES	Undissolved	<i>1-7,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-7,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-7,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-7,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-7,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-7,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-7,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey, Northern Metalmark occurs in forest and woodland openings and edges predominantly in areas characterized as glades within Red Cedar stands. It is also found in scrub/shrub land, successional fields, fens/meadows, habitat edges, and other suitable habitat types (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species.

Patch type Limited Extent is used for all records relating to this species and values any habitat suitable for this species to complete its life history, including areas suitable for breeding, nectaring, resting, and dispersal.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Pepper and Salt Skipper

BIOPID 293

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-4, *</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-4, *</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-4, *</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-4, *</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-4, *</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-4, *</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-4, *</i>
1800	RECREATIONAL LAND	Undissolved	<i>1-4, *</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-4, *</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-4, *</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-4, *</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-4, *</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-4, *</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-4, *</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-4, *</i>

4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4230	PLANTATION	Undissolved	<i>1-4,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-4,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-4,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-4,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-4,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-4,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
7100	BEACHES	Undissolved	<i>1-4,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-4,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-4,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-4,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-4,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Pepper and Salt Skipper is a species of fields, grasslands, forest gaps and glades often in and near wetlands containing native grasses which are its larval host plant. This species will utilize a variety of native wildflowers and adjacent habitats for nectaring.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Pine Barrens Bluet

BIOPID 102

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-10,*
1419	BRIDGE OVER WATER	Adjacent/Riparian Undissolved	1-10,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-10,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-10,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-10,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-10,*
1711	CEMETERY ON WETLAND	Adjacent/Riparian Undissolved	1-10,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-10,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-10,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-10,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-10,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-10,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent/Riparian Undissolved	1-10,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-10,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-10,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4230	PLANTATION	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	<i>1-10,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-10,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-10,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-10,*</i>
6120	FRESHWATER TIDAL MARSHES	Adjacent/Riparian Undissolved	<i>1-10,*</i>

6210	DECIDUOUS WOODED WETLANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6220	CONIFEROUS WOODED WETLANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-10,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-10,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-10,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7100	BEACHES	Undissolved	<i>1-10,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Pine Barrens Bluet

BIOPID 103

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-10,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-10,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-10,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-10,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-10,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-10,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-10,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-10,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-10,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-10,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-10,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-10,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-10,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-10,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-10,,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4230	PLANTATION	Undissolved	<i>1-10,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-10,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-10,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-10,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-10,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-10,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-10,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-10,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-10,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-10,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-10,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-10,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-10,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
7100	BEACHES	Undissolved	<i>1-10,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-10,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-10,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-10,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-10,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-10,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-10,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/ pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
 2. Barlow, A.E., Golden, D.M., and J. Bangma. 2009. Field Guide to Dragonflies and Damselflies of New Jersey. Flemington, NJ: PSI.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Rapids Clubtail

BIOPID 120

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Rapids Clubtail

BIOPID 121

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-13,*
1419	BRIDGE OVER WATER	Undissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Undissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-13,*
2400	OTHER AGRICULTURE	Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Rare Skipper

BIOPID 350

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-4,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-4,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-4,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-4,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-4,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-4,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-4,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-4,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-4,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-4,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-4,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-4,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-4,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-4,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>

4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-4,*</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1-4,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-4,*</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	<i>1-4,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-4,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-4,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-4,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Rare Skipper is a species of freshwater and brackish marshes and meadows with tall cordgrass which is its larval food plant. Adjacent fields, grasslands, meadows and a variety of other habitats with native wildflowers are important areas for nectaring.

Patch type Limited Extent is used for any records for this species. Due to the wide range of habitats that are important to this species, patch type Limited Extent is used to value suitable habitats that intersect with observed occurrences of this species.

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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Robust Baskettail

BIOPID 138

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4230	PLANTATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Dissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Robust Baskettail

BIOPID 139

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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5. Corser, J. D. 2010. Status and Ecology of a Rare Gomphid Dragonfly at the Northern Extent of its Range. Northeastern Naturalist, 17(2):341-345.
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 13. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Sable Clubtail

BIOPID 100

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent Undissolved	1-8,*
1419	BRIDGE OVER WATER	Undissolved	1-8,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-8,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-8,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-8,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	1-8,*
1711	CEMETERY ON WETLAND	Adjacent Undissolved	1-8,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	1-8,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	1-8,*
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	1-8,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-8,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-8,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent Undissolved	1-8,*
2300	CONFINED FEEDING OPERATIONS	Adjacent Undissolved	1-8,*
2400	OTHER AGRICULTURE	Adjacent Undissolved	1-8,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4230	PLANTATION	Undissolved	<i>1-8,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-8,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-8,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent Undissolved	<i>1-8,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-8,*</i>
5200	NATURAL LAKES	Adjacent Undissolved	<i>1-8,*</i>
5300	ARTIFICIAL LAKES	Adjacent Undissolved	<i>1-8,*</i>
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	<i>1-8,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-8,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-8,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
7100	BEACHES	Adjacent Undissolved	<i>1-8,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent Undissolved	<i>1-8,*</i>
7300	EXTRACTIVE MINING	Adjacent Undissolved	<i>1-8,*</i>
7400	ALTERED LANDS	Adjacent Undissolved	<i>1-8,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
7500	TRANSITIONAL AREAS	Adjacent Undissolved	<i>1-8,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent Undissolved	<i>1-8,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

Patch Type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and pupae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Sable Clubtail

BIOPID 101

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-8,*
1419	BRIDGE OVER WATER	Undissolved	1-8,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-8,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-8,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-8,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-8,*
1711	CEMETERY ON WETLAND	Undissolved	1-8,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-8,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-8,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-8,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-8,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-8,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-8,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-8,*
2400	OTHER AGRICULTURE	Undissolved	1-8,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4230	PLANTATION	Undissolved	<i>1-8,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-8,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-8,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-8,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-8,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-8,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-8,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-8,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-8,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-8,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
7100	BEACHES	Undissolved	<i>1-8,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-8,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-8,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-8,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-8,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-8,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
 2. Barlow, A.E., Golden, D.M., and J. Bangma. 2009. Field Guide to Dragonflies and Damselflies of New Jersey. Flemington, NJ: PSI.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Scarlet Bluet

BIOPID 106

REGION Statewide

PATCH TYPE Cardinal-Proximate *

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	<i>1-10,*</i>
1419	BRIDGE OVER WATER	Adjacent/Riparian Undissolved	<i>1-10,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-10,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
1711	CEMETERY ON WETLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	<i>1-10,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	<i>1-10,*</i>
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-10,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-10,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	<i>1-10,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4230	PLANTATION	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-10,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	<i>1-10,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-10,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-10,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-10,*</i>
6120	FRESHWATER TIDAL MARSHES	Adjacent/Riparian Undissolved	<i>1-10,*</i>

6210	DECIDUOUS WOODED WETLANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6220	CONIFEROUS WOODED WETLANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-10,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-10,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-10,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7100	BEACHES	Undissolved	<i>1-10,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-10,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-10,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Scarlet Bluet

BIOPID 107

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-10,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-10,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-10,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-10,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-10,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-10,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-10,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-10,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-10,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-10,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-10,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-10,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-10,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-10,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-10,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4230	PLANTATION	Undissolved	<i>1-10,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-10,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-10,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-10,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-10,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-10,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-10,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-10,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-10,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-10,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-10,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-10,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-10,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-10,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-10,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-10,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-10,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-10,*</i>
7100	BEACHES	Undissolved	<i>1-10,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-10,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-10,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-10,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-10,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-10,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-10,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a lake/ pond species that breeds in lakes and ponds and forages in the surrounding habitat (Barlow et al. 2009). LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Septima's Clubtail

BIOPID 110

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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 13. Westfall, Jr., M.J. and M.L. May. 2006. Damselflies of North America. Gainesville, FL: Scientific Publishers.
- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Septima's Clubtail

BIOPID 111

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-13,*
1419	BRIDGE OVER WATER	Undissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Undissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-13,*
2400	OTHER AGRICULTURE	Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Ski-tipped Emerald

BIOPID 150

REGION Statewide

PATCH TYPE Cardinal-Proximate *

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Dissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Dissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4230	PLANTATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Dissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Ski-tipped Emerald

BIOPID 151

REGION Statewide

PATCH TYPE LE.1 Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4230	PLANTATION	Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-13,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion – R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Spatterdock Darner

BIOPID 140

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4230	PLANTATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Dissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
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6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Spatterdock Darner

BIOPID 141

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	<i>1-13,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-13,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-13,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-13,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-13,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-13,*</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-13,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-13,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-13,*</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-13,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-13,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-13,*</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-13,*</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-13,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
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4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
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6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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2. Barlow, A.E., Golden, D.M., and J. Bangma. 2009. Field Guide to Dragonflies and Damselflies of New Jersey. Flemington, NJ: PSI.
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4. Bried, J. T. and G. N. Ervin. 2006. Abundance Patterns of Dragonflies Along a Wetland Buffer. Wetlands, 26(3): 878-883.
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7. Hunt, P.D., Blust, M. and F. Morrison. 2010. Lotic Odonata of the Connecticut River in New Hampshire and Vermont. Northeastern Naturalist, 17(2):175-188.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Subarctic Darter

BIOPID 144

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4230	PLANTATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Dissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Superb Jeweling

BIOPID 124

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

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This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Superb Jeweling

BIOPID 125

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-13,*
1419	BRIDGE OVER WATER	Undissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Undissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-13,*
2400	OTHER AGRICULTURE	Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Tiger Spiketail

BIOPID 96

REGION Statewide

PATCH TYPE Cardinal-Proximate *

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent Undissolved	<i>1-8,*</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1-8,*</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-8,*</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-8,*</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-8,*</i>
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent Undissolved	<i>1-8,*</i>
1711	CEMETERY ON WETLAND	Adjacent Undissolved	<i>1-8,*</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent Undissolved	<i>1-8,*</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent Undissolved	<i>1-8,*</i>
2100	CROPLAND AND PASTURELAND	Adjacent Undissolved	<i>1-8,*</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-8,*</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Adjacent Undissolved	<i>1-8,*</i>
2300	CONFINED FEEDING OPERATIONS	Adjacent Undissolved	<i>1-8,*</i>
2400	OTHER AGRICULTURE	Adjacent Undissolved	<i>1-8,*</i>

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4230	PLANTATION	Undissolved	<i>1-8,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-8,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-8,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent Undissolved	<i>1-8,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-8,*</i>
5200	NATURAL LAKES	Adjacent Undissolved	<i>1-8,*</i>
5300	ARTIFICIAL LAKES	Adjacent Undissolved	<i>1-8,*</i>
6120	FRESHWATER TIDAL MARSHES	Adjacent Undissolved	<i>1-8,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-8,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-8,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
7100	BEACHES	Adjacent Undissolved	<i>1-8,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent Undissolved	<i>1-8,*</i>
7300	EXTRACTIVE MINING	Adjacent Undissolved	<i>1-8,*</i>
7400	ALTERED LANDS	Adjacent Undissolved	<i>1-8,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
7500	TRANSITIONAL AREAS	Adjacent Undissolved	<i>1-8,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent Undissolved	<i>1-8,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and pupae). The LULC classes suitable for breeding by this species are undissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Tiger Spiketail

BIOPID 97

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-8,*
1419	BRIDGE OVER WATER	Undissolved	1-8,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-8,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-8,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-8,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-8,*
1711	CEMETERY ON WETLAND	Undissolved	1-8,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-8,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-8,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-8,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-8,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-8,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-8,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-8,*
2400	OTHER AGRICULTURE	Undissolved	1-8,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4230	PLANTATION	Undissolved	<i>1-8,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-8,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-8,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-8,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-8,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-8,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-8,*</i>
5200	NATURAL LAKES	Undissolved	<i>1-8,*</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-8,*</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-8,*</i>

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-8,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-8,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-8,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-8,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-8,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-8,*</i>
7100	BEACHES	Undissolved	<i>1-8,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-8,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-8,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-8,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-8,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-8,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-8,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This species is an interior forest species that inhabits small woodland streams, trickles, and seepages (Barlow et al. 2009). These habitats are often masked or not visible in the Department's Land Use/Land Cover GIS layers. The LULC classes selected are those that are most likely to contain these key habitat features. The classes selected also represent habitats suitable for use by this species for breeding and nonbreeding activities in relation to the occurrence. Odonates use aquatic habitats for breeding activities and will often use a wide variety of nonaquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Two-spotted Skipper

BIOPID 14

REGION Statewide

PATCH TYPE Cardinal-Proximate

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Dissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Dissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1-6,*
1711	CEMETERY ON WETLAND	Dissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Dissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-6,*
2400	OTHER AGRICULTURE	Dissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-6,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4230	PLANTATION	Dissolved	1-6,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-6,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-6,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent Undissolved	1-6,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1-6,*
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	1-6,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-6,*
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-6,*
6210	DECIDUOUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6220	CONIFEROUS WOODED WETLANDS	Adjacent Undissolved	1-6,*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1-6,*
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-6,*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1-6,*

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-6,*</i>
7100	BEACHES	Dissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Dissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in wet meadows/savannahs, bogs, sedge meadows, stream/seepage sedge marshes, and gaps in swamps/wooded wetlands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable breeding and nectaring habitat as well as adjacent habitat types that would be suitable for nonbreeding use (additional nectaring, dispersal, etc.).

Patch type Cardinal-Proximate is applied to value habitats for any breeding/courtship, territorial, larvae or pupae records for this species. This patch type values contiguous habitats that would mainly be suitable for breeding and nectaring. Land Use/Land Cover types that provide suitable habitat for resting/shelter, additional nectaring, and dispersal are only valued when they are adjacent to valued breeding habitats.

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* ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Two-spotted Skipper

BIOPID 15

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-6,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-6,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-6,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-6,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-6,*
1711	CEMETERY ON WETLAND	Undissolved	1-6,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-6,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-6,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-6,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-6,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-6,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-6,*
2400	OTHER AGRICULTURE	Undissolved	1-6,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-6,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-6,*

4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4230	PLANTATION	Undissolved	<i>1-6,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-6,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-6,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-6,*</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-6,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-6,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-6,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-6,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6,*</i>
7100	BEACHES	Undissolved	<i>1-6,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-6,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-6,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-6,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-6,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-6,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-6,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

In New Jersey this species occurs in wet meadows/savannahs, bogs, sedge meadows, stream/seepage sedge marshes, and gaps in swamps/wooded wetlands (NatureServe 2010). Land Use/Land Cover classes were selected that would represent suitable habitat for both breeding and nonbreeding use by this species

Patch type Limited Extent is used for any observed flyby or nectaring records for this species. There is limited information on the landscape ecology of lepidoptera, so patch type Limited Extent is used to value suitable habitats that intersect with observed flyby and nectaring (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Williamson's Emerald

BIOPID 148

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4230	PLANTATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	<i>1-13,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	<i>1-13,*</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-13,*</i>
5200	NATURAL LAKES	Dissolved	<i>1-13,*</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>1-13,*</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved	<i>1-13,*</i>

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Williamson's Emerald

BIOPID 149

REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-13,*
1419	BRIDGE OVER WATER	Undissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Undissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	1-13,*
2400	OTHER AGRICULTURE	Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1-13,*
4230	PLANTATION	Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Undissolved	1-13,*
5300	ARTIFICIAL LAKES	Undissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13,*</i>
7100	BEACHES	Undissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a species of drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

There is limited information on the landscape ecology of odonates, so patch type Limited Extent is applied to value suitable habitats that intersect with foraging and occupied-habitat (non-breeding) occurrences of this species. These occurrences are not directly linked to breeding activity but still represent essential habitats utilized by the species and the potential for undocumented breeding activity in the vicinity.

Literature Citations

1. Abbott, J.C. 2007. OdonataCentral: An online resource for the distribution and identification of Odonata. Texas Natural Science Center, The University of Texas at Austin. Available at <http://www.odonatacentral.org>. (Accessed: July 07, 2011).
2. Barlow, A.E., Golden, D.M., and J. Bangma. 2009. Field Guide to Dragonflies and Damselflies of New Jersey. Flemington, NJ: PSI.
3. Biber, E. 2002. Habitat Analysis of a Rare Dragonfly (*Williamsonia lintneri*) in Rhode Island. Northern Naturalist, 9(3):341-352.
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9. NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>.
10. Needham, J.G., M.J. Westfall, and M.L. May. 2000. Dragonflies of North America, revised edition. Gainesville, FL: Scientific Publishers.

11. Nikula, B., Ryan, J.L., and M.R. Burne. 2007. A Field Guide to the Dragonflies and Damselflies of Massachusetts 2nd ed. Westborough, MA: Massachusetts Division of Fisheries and Wildlife-Natural Heritage & Endangered Species Program.
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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Zebra Clubtail

BIOPID 130

REGION Statewide

PATCH TYPE Cardinal-Proximate *

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Adjacent/Riparian Undissolved	1-13,*
1419	BRIDGE OVER WATER	Dissolved	1-13,*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-13,*
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Adjacent/Riparian Undissolved	1-13,*
1700	OTHER URBAN OR BUILT-UP LAND	Adjacent/Riparian Undissolved	1-13,*
1711	CEMETERY ON WETLAND	Dissolved	1-13,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Adjacent/Riparian Undissolved	1-13,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Adjacent/Riparian Undissolved	1-13,*
2100	CROPLAND AND PASTURELAND	Adjacent/Riparian Undissolved	1-13,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1-13,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1-13,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1-13,*
2300	CONFINED FEEDING OPERATIONS	Adjacent/Riparian Undissolved	1-13,*
2400	OTHER AGRICULTURE	Adjacent/Riparian Undissolved	1-13,*

4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4230	PLANTATION	Adjacent/Riparian Undissolved	1-13,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Adjacent/Riparian Undissolved	1-13,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Adjacent/Riparian Undissolved	1-13,*
4411	PHRAGMITES DOMINATE OLD FIELD	Adjacent/Riparian Undissolved	1-13,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Adjacent/Riparian Undissolved	1-13,*
4500	SEVERE BURNED UPLAND VEGETATION	Adjacent/Riparian Undissolved	1-13,*
5100	STREAMS AND CANALS	Undissolved	1-13,*
5200	NATURAL LAKES	Dissolved	1-13,*
5300	ARTIFICIAL LAKES	Dissolved	1-13,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-13,*

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-13,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-13,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-13,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-13,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-13,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-13,*</i>
7100	BEACHES	Dissolved	<i>1-13,*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7300	EXTRACTIVE MINING	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7400	ALTERED LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7500	TRANSITIONAL AREAS	Adjacent/Riparian Undissolved	<i>1-13,*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Adjacent/Riparian Undissolved	<i>1-13,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

This utilizes drainages, streams, creeks, rivers, and their associated habitats (Barlow et al. 2009). It uses the stream for breeding and the surrounding habitat for foraging and dispersal. LULC classes were selected that represent areas suitable for both breeding and nonbreeding habitat for this species. Odonates use aquatic habitats for breeding activities and will often use a wide variety of adjacent or nearby non-aquatic habitats for nonbreeding purposes.

Patch type Cardinal-Proximate is applied for all records related to breeding occurrences (breeding/courtship, territorial, larvae, and exuviae). The LULC classes suitable for breeding by this species are dissolved, and the adjacent habitats, remaining undissolved, are suitable for foraging and dispersal corridors for the species.

This species' feature label combination differs from the standard Cardinal-Proximate patch type in how it treats LULC class 5100 (Streams and Canals). 5100 is the only undissolved LULC treatment within this species' feature label/ LULC combination. It remains undissolved and is only valued when it intersects the SOA. The valued 5100 polygons are then used to value any adjacent dissolved patches. The valued dissolved patches, as well as the valued 5100 polygons, are considered the cardinal set of LULC classes and are used to value the (undissolved) riparian classes that are adjacent. This serves to minimize the overvaluing of habitat in areas of contiguous LULC class 5100.

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- * ENSP biologist expert opinion - R. Somes

Land Use Land Cover Selections and Patch Type Justifications

Allegheny Woodrat

BIOPID 219

REGION Statewide

PATCH TYPE Contiguous Area

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,4,10
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,4,10
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	4
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	4
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	4
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	4
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	4
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	4
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	4
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	4
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	4
6210	DECIDUOUS WOODED WETLANDS	Dissolved	4,9
6220	CONIFEROUS WOODED WETLANDS	Dissolved	4,9
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	9
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	9

7200

BARE EXPOSED ROCK, ROCK SLIDES, ETC.

Dissolved

1,4,7-10

Land Use - Land Cover Selection and Patch Type Rationale

The Allegheny woodrat is closely associated with cliffs and talus slopes, rock outcrops and caves and abandoned mines within forested regions of the central and southern Appalachian Mountains from New York to Tennessee (Wiley 1980). Balcom and Yahner (1996) found that Allegheny woodrats in the northeast appear to prefer sites with a high percentage of rock cover, greater slope and less overstory basal area for building their nests. In New Jersey, woodrats construct their nests, or middens, in the voids between boulders in talus slopes and rock outcrops within forested habitats generally near the edge of talus fields where some overstory tree cover exists (Valent expert opinion).

Castleberry (2000) found that Allegheny woodrats use habitats adjacent to the talus habitat where their middens are located. Their diets are varied and it has been documented to consist of various parts of most of the plant species found in its domain (Poole 1940). In addition, other researchers have reported the woodrats' food as various fruits and berries, including mountain ash, blackberry, dogwood, sumac fruit, poison ivy, wild grape, wild cherry, shadberry, ferns, hard mast and fungi (Newcombe 1930). In areas where forested and clear-cut habitats are adjacent to talus, woodrats use both habitats in proportion to their availability (Castleberry 2000). A dense understory growth of hardwood stump sprouts, blackberry, and greenbrier, along with logging debris, was present on clear-cut sites. The dense understory provided security from avian predators and allowed woodrats to utilize the increased food resources found on clear-cut sites. Most research on woodrat habitat concludes that they will make use of any vegetated habitat type found within close proximity of their midden as long as it provides protective cover from predators (Balcom and Yahner 1996; Castleberry 2000).

Castleberry (2000) estimated mean topographic home ranges for 34 Allegheny woodrats in West Virginia at 4.4 ha. However, resource availability likely has a significant influence on home range size and has been well documented in other rodent species (Boutin 1990; Jones 1990; Bowers et al. 1990; Lacher and Mares 1996). Therefore, the Contiguous Area patch type is applied because it values suitable habitat based on the LULC classes listed above within and beyond the species occurrence area, which is nearly always located in nesting habitat, and in all cases values both foraging and midden habitat associated with an SOA.

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* ENSP biologist expert opinion – M. Valent

Land Use Land Cover Selections and Patch Type Justifications

Big Brown Bat

BIOPID 326

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	2,25
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Dissolved	2,25
1420	RAILROADS	Dissolved	11b
1440	AIRPORT FACILITIES	Dissolved	26
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	13,20
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	2
1499	STORMWATER BASIN	Dissolved	20,24
1710	CEMETERY	Dissolved	15
1711	CEMETERY ON WETLAND	Dissolved	15
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	20,24
2100	CROPLAND AND PASTURELAND	Dissolved	13
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	20
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	6,11
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	15
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,6,16,17,22,24,27,29

4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>2,6,16,17,22,24,27,29</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>2,6,14,17,24,27,29,31</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>2,3,6,14,17,24,27,29,31</i>
4230	PLANTATION	Dissolved	<i>3,10,24</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>2,5,6,17,24,27,29</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>2,5,6,17,24,27,29</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>2,5,6,16,17,24,27,29</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>2,5,6,16,17,24,27,29</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>2,13</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>2,6,11</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>2,6,11</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>2,6,11</i>
5100	STREAMS AND CANALS	Dissolved	<i>3,20,27</i>
5200	NATURAL LAKES	Dissolved	<i>24,27</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>24,27</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>8,20,24</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>20,24</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>20,24</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>6,24</i>

6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>6,24</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>6,24</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>6,24</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>13</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>8,20,24</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>20,24</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>18</i>
7300	EXTRACTIVE MINING	Dissolved	<i>4,23</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels for Big Brown Bat tracked in the Biotics Database, as habitat use by this species does not vary significantly between the active and inactive seasons or between sexes or age classes.

Big Brown Bats are one of the most widespread and familiar bat species of North America, owing to their adaptable and colonial nature. They inhabit forests of various deciduous (22), coniferous/pine (24, 31), and mixed-wood (17, 24) types, from high elevations (31) to bottomlands (8, 26). Big Brown Bats are likely the most abundant bat species in forested urban parks (15) and the urbanizing environments (20) of our region, though in natural settings they prefer mature forest stands with large-diameter trees and relatively high snag densities (5). They will make use of thinned, burned or managed forest stands (22). Wetland connectivity is an important landscape factor (20).

Big Brown Bats roost in trees beneath loose bark (28), in cavities excavated by woodpeckers (16, 17, 28), and in other natural cavities and crevices (3, 14, 28, 30). Roost trees are commonly among the largest and tallest available (5, 28) and located within relatively open canopy (5, 22, 28) for sun exposure. Big Brown Bats switch roosts within generally small areas (5) but show fidelity to particular trees or groups of trees between years (16, 29). Big Brown Bats are also adaptable to man-made structures, roosting and forming large maternity colonies in structures such as buildings (2, 10, 15, 18, 19, 27), bat houses (10), pavilions (27), and bridges (2, 7), where predation risk is lower and warmer microenvironments favor early birth and volancy of juveniles (19, 21). They have been found to roost in rock crevices as well (18). Big Brown Bats forage for insects over slow-moving rivers (3, 9), in riparian areas (2, 10, 27) and wetlands (20), within the forest subcanopy (2, 22), and in various suburban and urban settings (15, 20).

During winter, Big Brown Bats hibernate in caves and mines (2, 4, 23) and abandoned railroad tunnels (11b) with large passages, noticeable air flow, dry, cool climates, and access to standing water (23). They are periodically active throughout the winter, especially when temperatures are above 12 C (25), and commonly move among hibernacula (1). Big Brown Bats are known to use buildings for hibernation as well (2).

The Contiguous Area patch type is used to value suitable Big Brown Bat habitat from the LULC classes cited, within and contiguous to each documented Species Occurrence Area (SOA). Big Brown Bat SOAs are primarily from netting/trapping locations, sightings during hibernation surveys, and roost locations reported by homeowners and citizens. The Contiguous Area patch type, dissolved to integrate contiguous habitats, appropriately values both foraging and roosting habitats associated with the documented SOAs, as foraging can occur a considerable distance from a colony's network of roosts.

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Land Use Land Cover Selections and Patch Type Justifications

Bobcat

BIOPID 46

REGION Statewide

PATCH TYPE Contiguous Area *

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved and Riparian Dissolved	8,11
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved and Riparian Dissolved	8,11
2100	CROPLAND AND PASTURELAND	Dissolved and Riparian Dissolved	7,11
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved and Riparian Dissolved	11
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved and Riparian Dissolved	2,11
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	1,3,4,6,7,9-12
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	1,3,4,6,7,9-12
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	1,3,4,6,7,9-12
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	1,3,4,6,7,9-12
4230	PLANTATION	Dissolved and Riparian Dissolved	1,3,4,6,7,9-12
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	1,3,4,6,7,9-12

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	<i>1,3,4,6-12</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	<i>1,3,4,6-12</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved and Riparian Dissolved	<i>1,3,4,6-12</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved and Riparian Dissolved	<i>7,11</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved and Riparian Dissolved	<i>*</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved and Riparian Dissolved	<i>1,7,11</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved and Riparian Dissolved	<i>1,7,11</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved and Riparian Dissolved	<i>1,7,11</i>
6120	FRESHWATER TIDAL MARSHES	Dissolved and Riparian Dissolved	<i>2,6</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved and Riparian Dissolved	<i>1,3,4,6,7,9-12</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved and Riparian Dissolved	<i>1,3,4,6,7,9-12</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved and Riparian Dissolved	<i>10</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved and Riparian Dissolved	<i>1,7,11</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved and Riparian Dissolved	<i>1,7,11</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved and Riparian Dissolved	<i>1,7,11</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved and Riparian Dissolved	<i>1,7,11</i>
6240	HERBACEOUS WETLANDS	Dissolved and Riparian Dissolved	<i>1,7,11</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved and Riparian Dissolved	<i>*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved and Riparian Dissolved	<i>1,3,4,6,7,9-12</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved and Riparian Dissolved	<i>1,3,4,6,7,9-12</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels tracked in the Biotics Database as habitat use does not vary significantly between sexes, breeding season and non-breeding season.

Bobcats are highly adaptable animals that can survive in a wide variety of habitats as long as there is abundant prey available. Bobcats prefer habitats that contain a mix of seral stages containing emergent, scrub/shrub and forested wetlands, upland and lowland deciduous, coniferous and mixed forests, old fields, scrub/shrub, rocky outcrops and sparse agriculture (Lariviere and 1997). Bobcats require areas of dense cover for resting, reproduction and protection from weather and predators. Rocky outcrops are often used for resting, cover and rearing of young (Schantz and Valent 2003). Where rock outcrops are not available as dens, bobcats will use hollow logs, brush thickets, cavities in the base of trees, brush piles, abandoned beaver lodges and occasionally old abandoned buildings or foundations (Hatler et al. 2003).

Bobcat home range sizes are highly variable, both geographically and intrasexually in the same geographic area, particularly if suitable habitat components have a patchy distribution (Lovallo 1999). The home range size of males is generally larger than that of females. In New Jersey, the annual home range of a male in 2002 was 121 km² with a core of 19 km² and the home range of a female in 2003 was 90 km² with a core of 11.7 km², as estimated by kernel home range method (ENSP 2011). The Contiguous Area patch type is applied to value suitable bobcat habitat based on occurrence records in the Biotics database for all feature label types. Although bobcats are considered habitat generalists, they do not occur in areas that are highly altered by agriculture or development. Bobcat habitat is identified using the LULC classes listed and applying a modified Contiguous Area patch type. To avoid valuing large, contiguous areas of agriculture, which bobcats typically avoid, only LULC class 2100 (cropland and pastureland) polygons less than 3 hectares in size are included with the other LULC classes to form the bobcat habitat patches that are available to be valued by bobcat occurrence data. Since bobcats have large home ranges, and therefore require large areas of suitable habitat, a minimum core size of 10 hectares is required for habitat patches to be valued by bobcat occurrence area data. Telemetry data in NJ has shown that riparian corridors are important for bobcats as travel routes between suitable habitat patches. Therefore, a second set of patches are created to be valued. The same set of LULC classes as listed above are dissolved together but only if they are coded as riparian, regardless of core area size. These riparian patches of habitat are valued if they intersect a bobcat SOA. However, suitable habitat patches less than 0.25 acre have been excluded from being valued within the riparian zone due to their small size.

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* ENSP biologist expert opinion – M. Valent

Land Use Land Cover Selections and Patch Type Justifications

Bottlenose Dolphin **BIOPID** 316 **REGION** Statewide **PATCH TYPE** LE.2 Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1,2,3</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1,2,3</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1,2,3</i>
5430	ATLANTIC OCEAN	Undissolved	<i>1,2,3</i>

Land Use – Land Cover Selection and Patch Type Rationale

Bottlenose dolphins have highly variable patterns of occurrence and distribution but are typically found along most continental coastlines (Toth et al. 2011), such as estuarine, coastal, continental shelf, and oceanic waters of the western North Atlantic (NOAA Fisheries, 2021). There are two genetically different stocks of bottlenose dolphins, a coastal form that is morphologically smaller and an offshore form that is much larger and more robust (NOAA Fisheries, 2021). Both stocks have different behaviors, prey preferences, and prefer different habitats and ranges (NOAA Fisheries, 2021). The coastal form of bottlenose dolphins is present along New Jersey's coastal waters and typically prefer waters relatively close to shore, like inland waters such as bays and estuaries, and over the continental shelf. They have been observed in local bays such as the Delaware Bay and Raritan Bays as well as semi-enclosed waters such as Barnegat Bay, Great Bay and the Navesink and Shrewsbury Rivers. Bottlenose dolphins off New Jersey's coast are seasonal migrants occurring only during the warmer months (Toth et al. 2011). They spend their winters as far south as North Carolina and return to New Jersey from May to until September or October.

Bottlenose dolphins can live very long lives, approximately 40 years with some females living up to 60 years or more (NOAA Fisheries, 2024). Most bottlenose dolphins in New Jersey breed in the summer when females reach anywhere from 5 to 15 years, depending on population, and give birth every 3 to 6 years (NOAA Fisheries, 2024). Gestational period is about 12 months and once calves are born, they nurse for about 20 months or more while staying with their mothers for up to 6 years (NOAA Fisheries, 2024). Therefore, bottlenose dolphins will utilize different habitats, such as nearshore and offshore areas in the Atlantic Ocean, but mostly for New Jersey they will utilize waters close to shore and inland waters (open tidal bays, river mouths and estuaries) for migrating, breeding and/or feeding.

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Land Use Land Cover Selections and Patch Type Justifications

Eastern Red Bat

BIOPID 333

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	2,28
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Dissolved	2,28
1440	AIRPORT FACILITIES	Dissolved	29
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	18,24
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	7
1499	STORMWATER BASIN	Dissolved	24
1710	CEMETERY	Dissolved	29
1711	CEMETERY ON WETLAND	Dissolved	29
2100	CROPLAND AND PASTURELAND	Dissolved	29
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	29
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	29
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	25
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	5,7,12,13,15,16,19,20,22
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	5,7,12,13,15,16,19,20,22
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	6,9,15

4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	6,9,15
4230	PLANTATION	Dissolved	6,9,15
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	6,12,13,15,16
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	6,12,13,15,16
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	6,12,13,15,16
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	6,12,13,15,16
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	6,7
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	25
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	6,9
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	6
5100	STREAMS AND CANALS	Dissolved	6,7,18,24
6130	VEGETATED DUNE COMMUNITIES	Dissolved	9
6210	DECIDUOUS WOODED WETLANDS	Dissolved	7,16
6220	CONIFEROUS WOODED WETLANDS	Dissolved	9
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	9
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	25
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	25
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	25
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	25

6240	HERBACEOUS WETLANDS	Dissolved	7
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	9
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	9

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels for Eastern Red Bat tracked in the Biotics Database, as habitat use by this species within New Jersey does not vary significantly between the active and inactive seasons or between sexes or age classes.

Eastern Red Bats are a tree-roosting species with a wide geographic range across eastern North America (3). They are common in a variety of woodland habitats (2, 20), including deciduous (5, 7, 12, 13, 15, 16, 19, 20, 22), mixed-wood (6, 13)/mesophytic (12) and coniferous forests (6, 9, 13, 15, 16), bottomland hardwood swamps (7, 16), and plantations (6, 9). Both unmanaged and actively managed forests are used (5, 6).

Eastern Red Bats roost in the outer foliage of tree canopies (12, 15, 16, 22) and sub-canopies (2), generally around 15 meters or more above ground (12, 22). Males and females have been found to show similar preference for live, large-diameter trees (5, 12, 15, 16, 20, 21) that surpass those around them (16, 21); particularly hardwoods such as hickory, oak and sweet gum (12, 20, 21, 22). In one study from central Arkansas, 95% of male roosts and 92% of female roosts were in mature forest stands with trees greater than 50 years old (21). Eastern Red Bats will also roost in conifers (25), shrubs (25), saplings (21), and a variety of other vegetated or concealed places (16), such as in leaf litter (15), dense grass (15), caves/mines (24, 25), or even beneath the shingles of houses (15). They switch roosts frequently - every 2.3 days on average in one study (12) and almost daily in another (15) - with roosts often used by different individuals on different days (26). During the night, Eastern Red Bats forage for insects above the forest canopy (1, 18), in young, open forest patches or thinned stands (6, 9), in fields and pastures (7, 29), and in riparian and open water habitats (7, 9, 18, 24, 29).

Eastern Red Bats are one of three New Jersey bat species that migrate south for winter. They are believed to travel to the southern United States, Mexico, and Bermuda where insect prey remain available (4). Eastern Red Bats have been documented along and offshore of the Atlantic Coast during migration season and may migrate in diurnal flocks (3). It is worth noting that migratory bats - including Eastern Red Bats - are vulnerable to encounters with wind energy facilities along their migration routes, particularly in late summer through early autumn and along forested ridgetops in the eastern U.S. (13b). More than 600,000 bats are estimated to have been killed by turbines in the contiguous U.S. in 2012 alone (10). Eastern Red Bats are also vulnerable to striking tall buildings during migration (3, 27).

While they are commonly migratory, Eastern Red Bats appear able to withstand great fluctuations in weather and temperature (18, 26) and are known to overwinter at higher latitudes as well (2, 14, 19, 22, 23). These bats alternate between tree or shrub roosts and the leaf litter, opting for the warmer, more humid microclimate of the leaf litter when air temperatures approach freezing (13, 14, 15, 19, 22, 23). Winter roost sites are often located on south-facing slopes with sun exposure (14, 19, 22). Red Bats may become active on warm winter afternoons and nights to forage (13, 22, 26).

The Contiguous Area patch type is used to value suitable Red Bat habitat from the LULC classes cited, within and contiguous to each documented Species Occurrence Area (SOA). Red Bat SOAs are primarily from netting/trapping locations, professionally-vetted acoustic survey recordings collected during summer and migration time, and occasional reports from the public and from local/state health departments. The Contiguous Area patch type, dissolved to integrate contiguous habitats, appropriately values both foraging and roosting habitats associated with the documented SOAs, as foraging can occur a considerable distance from roosts.

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Land Use Land Cover Selections and Patch Type Justifications

Eastern Small-footed Myotis

BIOPID 330

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	<i>1b,13</i>
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Dissolved	<i>1b</i>
1420	RAILROADS	Dissolved	<i>8</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	<i>23</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>23</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>2</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	<i>4</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	<i>4,22</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>1b,3,9,10,14,19</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1b,1,2,3,9,10,14</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	<i>2,9</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>1,2,9</i>
4230	PLANTATION	Dissolved	<i>2,9</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>9</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,2,9</i>

4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>9</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>1,1b,2,9</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1b,2,4,9,22</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>4,9,22</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>9,22</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>9,22</i>
5100	STREAMS AND CANALS	Dissolved	<i>9,20</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1b,4,9,10</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>4</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1b,4</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>4</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1b,4</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>4</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>4,10</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1b,4,10</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>4</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>18,9,10,12,14,19,20,22</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1,2,4b,5,6,7,14,17,21</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels for Eastern Small-footed Myotis tracked in the Biotics Database, as habitat use by this species does not vary significantly between the active and inactive seasons or between sexes or age classes.

Eastern Small-footed Myotis are rare throughout their range (8) in the Appalachian (10, 19), Ridge and Valley (5, 9), Highland (1), and Piedmont (5) landscapes of the eastern U.S. They inhabit exposed rocky areas like talus slopes (12, 19), boulder fields (14, 20), shale barrens (8), and rock outcrops (9, 14, 19, 22) where they roost primarily in ground-level rock crevices (10, 19) as well as in fractures in vertical cliffs and behind or beneath loose rock (10, 20, 22). They typically occur at elevations of 200-800 meters (1, 2, 3, 9). Roosts are often on south/southwest-facing slopes (14, 19, 20) with high solar exposure (9, 10, 19, 20), an average canopy cover below 20% (19), and close proximity to vegetation (10). Eastern Small-footed Myotis are often solitary but may roost in colonies of up to 30 bats (2). Males and females choose similar roosts (19) and switch roosts almost daily (10), with distances of around 50 meters between consecutive roosting locations (8, 10). Females have been found to roost closer to ephemeral water sources (average 226 meters) than males (average 458 meters) (10). On occasion, Eastern Small-footed Myotis have been documented roosting in trees (19), bridges (15, 19), rock dams (22), holes in the ground (4), and buildings (2b, 4, 15, 19), and using the ceilings of caves as night roosts (2).

Eastern Small-footed Myotis forage in the forests and ridge tops immediately surrounding their roost areas (9, 10), including deciduous, coniferous, and mixed forest types of oak, hickory, beech, maple, ash, hemlock, pine, and red cedar (2, 3, 9). Second-growth forests are used to a greater degree than old-growth, although the availability of open rocky features may be more important than forest type (3). Wetlands (9), ponds (15), farm ponds (20), ephemeral pools and wetlands (4, 9, 10), canals (9), and other water resources are used by Eastern Small-footed Myotis. They also forage over open fields (2), pastures (9) and scrub-shrub habitats (4, 22) near forests (9), for prey comprised mostly of moths (Lepidoptera), true flies (Diptera) and beetles (Coleoptera) (11). Dietary studies indicate that ground-based invertebrates like spiders and crickets are also preyed upon (11).

Eastern Small-footed Myotis are among the last to settle into hibernacula in the fall and the first to depart in spring (2). Hibernation sites mainly include caves/mines (1, 2, 4b, 5, 6, 7, 14, 17, 21) and abandoned railroad tunnels (8) with good air flow and low humidity (2). Eastern Small-footed Myotis can withstand severe weather and prefer to hibernate near drafty cave entrances, often in floor crevices or rock piles (2, 16, 18), where temperatures may drop below freezing (2, 16). Observations of torpid bats in March indicate that this species may also overwinter in talus slopes (12). Many hibernacula are found in steep hillsides within mature deciduous or hemlock forests (2). Eastern Small-footed Myotis hibernate in small numbers (14, 16), sometimes in mixed-species groups (1, 2, 6, 7), and are difficult to survey for (7, 14).

The Contiguous Area patch type is used to value suitable Eastern Small-footed Myotis habitat from the LULC classes cited, within and contiguous to each documented Species Occurrence Area (SOA). Eastern Small-footed Myotis SOAs are primarily from netting/trapping locations, sightings during hibernation surveys, and professionally-vetted acoustic survey recordings. The Contiguous Area patch type, dissolved to integrate contiguous habitats, appropriately values both foraging and roosting habitats associated with the documented SOAs, as foraging can occur a considerable distance from roosts.

With respect to the statewide habitat mapping for this species, we have decided to *exclude* structural Land Use/Land Cover patch types (i.e. residential LULCs and bridges) since their use by Eastern Small-footed Myotis is incidental relative to the broad coverage of these patch types across the state. State guidelines allow non-lethal removal of bats from human structures, which further marginalizes the need for structural “habitats” to be mapped for the Eastern Small-footed Myotis.

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Land Use Land Cover Selections and Patch Type Justifications

Fin Whale *BIOPID* 256 *REGION* Statewide *PATCH TYPE* Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1</i>
5430	ATLANTIC OCEAN	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean as well as nearshore. Only the Atlantic Ocean, Delaware Bay, and Raritan Bay may be valued for this species. New Jersey's inland bays and other marine waters are not suitable for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

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Land Use Land Cover Selections and Patch Type Justifications

Harbor Porpoise

BIOPID 317

REGION Statewide

PATCH TYPE LE.2 Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1419	BRIDGE OVER WATER	Undissolved	<i>1,2,3</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1,2,3</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1,2,3</i>
5430	ATLANTIC OCEAN	Undissolved	<i>1,2,3</i>

Land Use – Land Cover Selection and Patch Type Rationale

Harbor porpoises are widely distributed in the Northern Hemisphere and tend to move seasonally between nearshore areas and inland waters such as estuaries, bays, tidal areas, and river mouths to more offshore waters where they take advantage of different foraging opportunities (Rekdahl et al. 2023). Along the east coast, harbor porpoise congregates as far north as the Gulf of Maine, southern portion of Bay of Fundy, and around southern tip of Nova Scotia during the summer months (July to September) but disperse south from Maine to New Jersey during the fall (October to December) and spring (April to June) (NOAA Fisheries, 2021). During winter months (January to March), lower densities of harbor porpoise are found off the coast from New York to North Carolina and are monitored in deeper waters (NOAA Fisheries, 2021). Harbor porpoises are a relatively short-lived species with high metabolic demands (Rekdahl et al. 2023), however, little is known about their reproductive biology (NOAA Fisheries 2022). Females tend to be larger than males, reaching sexual maturity at 3 to 4 years and may give birth every year for several years (NOAA Fisheries 2022). Breeding typically occurs during the summer months (May to July) birthing only one young at a time with a gestation period of 10-11 months. The calf will nurse for about 6 to 12 months and remain with the mother for a long period of time (NOAA Fisheries 2022). Therefore, harbor porpoises will utilize different habitats, such as nearshore and offshore areas in the Atlantic Ocean as well as inland waters (open tidal bays, river mouths and estuaries) of New Jersey for different foraging opportunities (i.e. breeding, feeding, etc.).

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Land Use Land Cover Selections and Patch Type Justifications

Humpback Whale *BIOPID* 257 *REGION* Statewide *PATCH TYPE* Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1</i>
5430	ATLANTIC OCEAN	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean as well as nearshore. Only the Atlantic Ocean, Delaware Bay, and Raritan Bay may be valued for this species. New Jersey's inland bays and other marine waters are not suitable for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

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Land Use Land Cover Selections and Patch Type Justifications

Indiana Myotis

BIOPID 229

REGION Statewide

PATCH TYPE Contiguous Area

<i>LUI2</i>	<i>LABEL 12</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	8,10,14,24,25,25,31
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	8,10,14,24,25,25,31
2100	CROPLAND AND PASTURELAND	Dissolved	1,3,14,15,26,36
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1,3,14,15,26,36
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,17,20,26,29
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,17,20,26,29
4230	PLANTATION	Dissolved	7,9,13,14,16,20,26,29
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	7,9,13,14,16,20,26,29
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1,14,16,32,33
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	34

4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	34
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	9,10,21
5100	STREAMS AND CANALS	Dissolved	9,10,21
5200	NATURAL LAKES	Dissolved	9,10,21
5300	ARTIFICIAL LAKES	Dissolved	9,10,21
6210	DECIDUOUS WOODED WETLANDS	Dissolved	7,9,13,14,16,33,29
6220	CONIFEROUS WOODED WETLANDS	Dissolved	7,9,13,14,16,22,23,26,29
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	34
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	34
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	34
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	34
6240	HERBACEOUS WETLANDS	Dissolved	34
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	7,9,13,14,16,26,29
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	7,9,13,14,16,23,26,29
7300	EXTRACTIVE MINING	Dissolved	7,13,14,17,23

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels related to Indiana bat tracked in the Biotics Database, because habitat use during the active season does not vary significantly between sexes, breeding season and non-breeding season.

Murray and Kurta (2004) documented that linear distances between roosts and foraging areas for females range from 0.5 to 8.4 km (0.3 to 5.2 mi). However, most distances were less than half the maximum distance. In an Indiana study, one individual at a colony moved 8.4 km (5.2 mi) between roosts and foraging area (Brack 1983). However, the mean distance of 41 bats from the same colony was 3.0 km (1.9 mi). In a study conducted at Canoe Creek State Park in Pennsylvania, an area with significant changes in elevation, reported distances between roost and foraging areas ranged from 2.4 to 4.5 km (1.5 to 2.8 mi) with an average distance of 3.4 km (2.1 mi) (Butchkoski and Hassinger 2002).

During the summer months female Indiana bats typically roost under the exfoliating bark of dead or nearly dead trees that receive a significant amount of solar radiation throughout the day (Callahan 1993, Kurta et al. 2002, Carter 2003, Britzke et al. 2006). Over 30 species of trees have been documented as being used by Indiana bats during the summer. Most primary roost trees used by maternity colonies are large diameter (Kurta and Rice 2002, Whitaker and Brack 2002) deciduous species, with the exception of a few coniferous trees recently discovered in the Great Smoky Mountains (Britzke et al. 2003) and in New England (Palm 2003). Maternity roost trees are typically located in "open" situations such as a natural or man-made gap in the forest, along the edge of a woodlot, a copse of dead trees and grazed woodlands or pastures with scattered trees (USFWS 2007). In dense forest conditions maternity roosts often occur above the surrounding canopy where they receive greater exposure to sunlight (Callahan et al. 1997) or in suitable trees in, or adjacent to, natural or man-made gaps in the forest canopy. Several researchers have found no significant difference between primary and alternate roost trees and have noted that males may select smaller trees that receive less solar radiation than those typically selected by females. (Callahan et al. 1997, Kurta et al. 2002).

Indiana bats consistently use forested corridors for commuting from roosts to foraging areas and back as opposed to crossing large open areas (Gardner et al. 1991b, Verboom and Huitema 1997, Carter 2003, Chenger 2003, Murray and Kurta 2004, Winhold et al. 2005). Therefore, suitable patches of forest within acceptable travel distances of a roost may not be available to individuals unless they are connected by wooded corridors for travel (USFWS 2007).

Maternity colonies have been documented as occurring in riparian zones (Humphrey et al. 1977), bottomland and floodplain habitats (Carter 2003), upland communities (Gardner et al. 1991b, Palm 2003), and a mix of riparian and upland habitats (Callahan 1993). Kurta et al. (2002) reported maternity colonies from wooded wetland habitats. Most studies that looked at landscape level habitat features found that the areas surrounding known roosts contain primarily agricultural habitats with lesser amounts of forests and wetlands (Gardner et al. 1991b, Kurta et al. 2002). Carter et al. (2002) found that areas around roosts had fewer and smaller urban patches, larger patches of closed-canopy forests but occurred in highly fragmented forests with more patches of bottomland forest and agriculture than randomly chosen sites.

Foraging habitat usually occurs in closed to semi-open forested habitats and forest edges (Humphrey et al. 1977, LaVal et al. 1977, Brack 1983). Indiana bats have been documented to forage in floodplain, riparian, lowland and upland forests (Garner and Gardner 1992, Hobson and Holland 1995, Sparks 2003, Murray and Kurta 2004). They generally hunt around, not within, the canopy of trees. In Indiana, Brack (1983) found that Indiana bats frequently foraged in habitats with large foliage surfaces, including woodland edges and crowns of lone trees. Other documented habitats used for foraging include ponds, old fields, row crops and pastures (Garner and Gardner 1992, Gardner et al. 1991b).

The Contiguous Area patch type is applied to value suitable Indiana bat habitat from the LULC classes above within and beyond each documented species occurrence area. Indiana bat species occurrence areas include primarily trapping locations, known roost trees and telemetry locations. The Contiguous Area patch type does a good job in valuing both foraging and roosting habitats associated with the documented SOA as foraging areas can occur at a considerable distance from the roost location.

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Land Use Land Cover Selections and Patch Type Justifications

Little Brown Myotis

BIOPID 332

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	6
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Dissolved	6
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	6,21
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	6,21,28
1499	STORMWATER BASIN	Dissolved	3
1710	CEMETERY	Dissolved	20,21
1711	CEMETERY ON WETLAND	Dissolved	21
2100	CROPLAND AND PASTURELAND	Dissolved	4,21
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	18,21
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	21
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1,4
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	10,11,23,27
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	6,15,16,17,20,22,24,27
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	10,11
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	12,16,17

4230	PLANTATION	Dissolved	<i>12,16,17</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>10,11,21</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>10,12,16,17</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>10,11,21,27</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>7,10,16,17,21,22,25,27</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,21</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>1,11,16</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>11,16,21</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>11,16,21</i>
5100	STREAMS AND CANALS	Dissolved	<i>6,21,25,27,29</i>
5200	NATURAL LAKES	Dissolved	<i>5,11,12,18,19,27,28,29</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>18,19,27,28</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>18,24</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>24</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>24</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>21,24</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>21,24</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>21,24</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>21,24</i>

6240	HERBACEOUS WETLANDS	Dissolved	<i>21,27</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>24</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>24</i>
7300	EXTRACTIVE MINING	Dissolved	<i>9,13,14,25</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels for Little Brown Myotis tracked in the Biotics Database, as habitat use by this species does not vary significantly between the active and inactive seasons or between sexes or age classes.

Little Brown Myotis are one of the most widespread and familiar bat species of North America, owing to their adaptable and colonial nature. They are generalists (24) that mainly inhabit forested environments (4) of various deciduous (6, 15, 16, 17, 24), mixed-wood (7, 10, 25), and coniferous (12, 16, 17) types, including intensively managed forests (19) and coastal forests (19). Older forest stands are preferred over young ones (7, 16, 20). Little Brown Myotis are also commonly found in urban environments (5, 18), agricultural settings (4), and in transitional zones between urban and rural spaces (5).

Little Brown Myotis roost in a variety of cavities and crevices, particularly beneath loose tree bark (10, 17, 19), within trunks (10) and stumps (22), and in other cavities (10, 19, 22) offered by damaged or dead trees (7, 23, 24). Old growth forests (19, 20, 22) have particularly high suitability for roosting, as Little Brown Myotis prefer tall, large-diameter trees and snags (7, 10, 22). Colonies often use more than one roost tree (7). Little Browns also commonly roost in anthropogenic structures (2, 5, 6, 12, 14, 19, 24, 26, 29), such as house attics, barns, sheds, churches, other buildings, and artificial bat houses. Less commonly, they may roost in rock crevices and walls (14).

Little Brown Myotis forage nocturnally on insects, using echolocation to navigate. Preferred foraging grounds are riparian habitats (5, 6, 11, 20, 25), wetlands (6, 18, 21, 25), and over or near water bodies (2, 3, 4, 6, 12, 16, 17, 18, 19, 21, 23, 24, 27, 28) such as lakes, ponds, rivers, and streams, where the bats feed on emerged aquatic macroinvertebrates and a variety of other insect prey (4). They also forage in deciduous/hardwood (6, 16, 17, 24), coniferous (12, 16), and mixed forests (7, 25), under closed canopy (6) or in openings (2, 25), including areas of regeneration following clearcut or group selection harvest (11, 16). Herbaceous-edge habitats (20, 21) and corridors (6, 16, 28) are also used. In one study, juveniles were found to forage in open, low-clutter microhabitats while adults shifted to higher-clutter microhabitats to lessen competition for food (1).

From late fall through early spring, Little Brown Myotis hibernate in caves and abandoned mines (9, 13, 14, 25) where temperatures remain relatively stable and low but above freezing (13). Hibernacula may be as far as 300 km from the bats' summer range (8).

The Contiguous Area patch type is used to value suitable Little Brown Myotis habitat from the LULC classes cited, within and contiguous to each documented Species Occurrence Area (SOA). Little Brown Myotis SOAs are primarily from netting/trapping locations, sightings during hibernation surveys, and roost locations discovered through radio-telemetry or reports from homeowners. The Contiguous Area patch type, dissolved to integrate contiguous habitats, appropriately values both foraging and roosting habitats associated with the documented SOAs, as foraging can occur a considerable distance from roosts.

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Land Use Land Cover Selections and Patch Type Justifications

Meadow Jumping Mouse

BIOPID 329

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	2,5,6
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	2,6
2100	CROPLAND AND PASTURELAND	Dissolved	1,6
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1,3,5,6
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	3,5,6
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	5,6
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	5,6
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,5,6
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	2,5,6
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	5,6
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	1,3,5,6
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	5,6
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	2,5,6
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	5,6
5100	STREAMS AND CANALS	Dissolved	3,4,5,6

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>3,4,5,6</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>2,3,5,6</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>2,3,5,6</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>3,4,5,6</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>2,3,5,6</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>3,4,5,6</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>2,3,4,5,6</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1,3,5,6</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1,3,5,6</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>3,4,5,6</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>2,3,5,6</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels for Meadow Jumping Mouse tracked in the Biotics Database, as habitat use by this species does not vary significantly between seasons or between sexes or age classes.

The Meadow Jumping Mouse inhabits open areas such as grasslands (1, 3, 5, 6), pastures (1), prairies (3), riparian/"gallery" forests through sparsely treed landscapes (3, 5, 6), clear-cuts (2), wet open woods (5), forest edges (2), and brushy areas (5, 6). They are associated with thick herbaceous cover (6) and often with moist lowland or wetland conditions (1, 3, 4, 5, 6). Coarse woody debris in logged or forest-edge areas provides shelter for Meadow Jumping Mice and their invertebrate prey (2). The Meadow Jumping Mouse is significantly less common in the forest interior (2, 5) and in recently cut fields (5) and has been found to avoid areas of sparse ground vegetation (6).

The Contiguous Area patch type is used to value suitable Meadow Jumping Mouse habitat from the LULC classes cited, within and contiguous to each documented Species Occurrence Area (SOA). Meadow Jumping Mouse SOAs are primarily from targeted small mammal surveys by biologists and consultants.

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Land Use Land Cover Selections and Patch Type Justifications

North Atlantic Right Whale BIOPID 258 REGION Statewide PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5411	OPEN TIDAL BAYS	Undissolved	1
5430	ATLANTIC OCEAN	Undissolved	1,2

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean as well as nearshore. Only the Atlantic Ocean, Delaware Bay, and Raritan Bay may be valued for this species. New Jersey's inland bays and other marine waters are not suitable for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

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Land Use Land Cover Selections and Patch Type Justifications

Northern Hoary Bat

BIOPID 331

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	3,18
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Dissolved	3,18
1440	AIRPORT FACILITIES	Dissolved	16,17,18
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	19
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	19
1499	STORMWATER BASIN	Dissolved	4
1710	CEMETERY	Dissolved	7,19
1711	CEMETERY ON WETLAND	Dissolved	19
2100	CROPLAND AND PASTURELAND	Dissolved	17
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	17
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	19
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	17,19
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	12
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,3,5,6,13,16,22
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	12,20

4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>5,7,13,14,19,20,22</i>
4230	PLANTATION	Dissolved	<i>7</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>12,20</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>10,11,14,21</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>12,20</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>3,10,11,14,15,21</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>12,17,19</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>12,19</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>12,19</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>12,19</i>
5100	STREAMS AND CANALS	Dissolved	<i>22,25</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>19</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>19</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>19</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>19</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>19</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>19</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>19</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>19</i>

6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>19</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>19</i>
7500	TRANSITIONAL AREAS	Dissolved	<i>12</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels for Northern Hoary Bat tracked in the Biotics Database, as the limited information currently available on this species from the Northeast (19) do not suggest that habitat use within New Jersey should vary significantly between the active and inactive seasons or between sexes or age classes.

Northern Hoary Bats are a tree-roosting species with a wide geographic range across North America, occupying mature forested areas (10, 14, 16, 20) of coniferous (5, 7, 13, 14, 19, 20, 22), deciduous/hardwood (5, 6, 13, 16, 22), and mixed-wood stands (10, 11, 14, 21), particularly of pine and oak (14, 21). Both unmanaged and managed forests (14) of various patch sizes (16) are used.

Northern Hoary Bats roost among the foliage of overstory trees (5, 13, 14, 17, 20), typically at high positions in the canopy (13, 18, 19) with easterly/southeasterly exposure (14, 18, 20), and with dense foliar cover above and around the sides but open below (21). There is some evidence that males prefer conifers for roosting, while females prefer deciduous trees as maternity roosts (22). In a study from New Hampshire, however, one radio-tracked juvenile male Northern Hoary Bat roosted with its mother and sibling exclusively in Eastern Hemlocks (*Tsuga canadensis*) over a ten-day tracking period (19). Roost-switching may occur almost daily within a fairly small radius (within 0.5 hectare, for example) (19). There is at least one account of a mother Northern Hoary Bat and her young roosting beneath a bridge (8), though we are excluding bridges from the statewide habitat mapping for this species based on the incidental nature of their use.

Northern Hoary Bats forage for insects in and above the tree canopy (1, 2, 9, 11, 12, 19), along riparian corridors (22, 25), ponds (4), and wetlands (19), in old fields and agricultural fields (17), in early-successional forests and recently thinned or clearcut stands (12), and around other open habitats (19) such as airports/military bases (3, 16, 17, 18), residential areas (7), and wind facilities (1, 2, 7, 23) within a home range of approximately 150 hectares or less (17, 19).

Northern Hoary Bats are one of three New Jersey bat species that migrate south for winter, traveling perhaps hundreds or thousands of kilometers (23), though little is known about their migratory pathways or wintering locations (5b). Mexico is a known wintering ground; perhaps more so for males than females (5b). Northern Hoary Bats have been documented along the Atlantic Coastal Plain during migration season (24) and may travel in dispersed groups (25). Springtime migration appears to follow riparian corridors, where the bats forage as they travel (22, 25). The timing of spring migration is believed to coincide with seasonal abundance of moths (25), and females appear to embark on their spring migration about one month before males do (25). It is worth noting that migratory bats are vulnerable to encounters with wind energy facilities along their migration routes, particularly in late summer through early autumn and along forested ridgetops in the eastern U.S. (11b). More than 600,000 bats are estimated to have been killed by turbines in the contiguous U.S. in 2012 alone (7b). Northern Hoary Bats are the species most frequently killed by turbines in North America, and their population could decline by as much as 90% in the next 50 years if conservation measures are not taken (6b).

The Contiguous Area patch type is used to value suitable Northern Hoary Bat habitat from the LULC classes cited, within and contiguous to each documented Species Occurrence Area (SOA). Northern Hoary Bat SOAs are primarily from netting/trapping locations, professionally-vetted acoustic survey recordings, and occasional reports from the public and from local/state health departments. The Contiguous Area patch type, dissolved to integrate contiguous habitats, appropriately values both foraging and roosting habitats associated with the documented SOAs, as foraging can occur a considerable distance from roosts.

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Land Use Land Cover Selections and Patch Type Justifications

Northern Myotis

BIOPID 290

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	4,40,44
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Dissolved	4,40,44
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	31
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	31
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	4,7,9,11,18,21,25,31,32,34,35,40,41a,42,43,44
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	2,4,7,9,11,16,20,21,22,25,26,27,28,31,32,34,35,40,41a,42,43,44,46
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	13,18,20,22,26,35,38,39,41b
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	2,7,13,20,22,26,35,37,39,41b
4230	PLANTATION	Dissolved	13,37,38,39
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	5,7,8,13,20,26,30,35,38,39,41a,41b
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	2,5,7,8,13,20,26,30,35,39,41a,41b
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	4,6,7,8,11,21,30,31,35,40,44
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	2,4,6,7,8,11,20,21,26,27,30,35,36,40,44
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	4,9,11,18,25,31,32
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	11,18,20,22,31,39

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>4,11,18,31</i>
5100	STREAMS AND CANALS	Dissolved	<i>3,8,9,11,20,21,25,28,31,34,37,39,40,41a,41b,43</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>3,4,8,11,16,17,20,24,25,27,28,31,34,41b,42,43,44</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>8,20,41b</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>20,41a,41b</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>4,11,25,31</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>11,20,31,39</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>4,11,25,31</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>11,20,31,39</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>4,6,11,16,20,41a,44</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>20,41a</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1,9,27,31,40,44,45</i>

Northern Myotis - Land Use/Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels for Northern Myotis (also known as the northern long-eared bat) tracked in the Biotics Database, because habitat use by this species does not vary significantly between the active and inactive seasons or between sexes or age classes. Northern Myotis inhabit deciduous (4, 9, 11, 17, 18, 21, 22, 25), coniferous (13, 18, 20, 21, 22, 26, 35), and mixed forests (2, 8, 13, 25, 30, 35, 40), including industrial timberlands and plantations, such as those of loblolly pine (37, 39), and natural areas on military reservations (40, 44). They roost in a variety of tree species and tree sizes, sheltering mainly in cavities, crevices and beneath loose bark (11, 13, 20, 26, 28, 30, 32, 39, 43). While roost trees are generally selected relative to their abundance on the landscape (4), some radio-telemetry studies have found Northern Myotis using certain species more than expected (such as green ash and pin oak snags (11, 16), sassafras (4, 42), balsam fir (5), black locust snags (25, 32)) or less than expected (such as sugar maple (4), sweetgum snags (11), American elm (16)) based on availability. Some studies have found Northern Myotis roosting more commonly in bottomland/floodplain forests (11, 43) or in wetlands where the bases of roost trees were submerged in water, favoring snag creation (16). Others have found these bats to choose roost trees at higher elevations more often (29). Risley (41a, 41b) has observed an association between Northern Myotis and Atlantic white cedar swamps.

Reproductive (lactating) females tend to choose larger trees in more open canopies and in later stages of decay (4, 5, 9, 18, 25, 26, 38) than non-reproductive females or males, but still tolerate higher canopy covers and more obstructed environments compared to Indiana bats (11, 16). Lactating females also tend to roost high up in those large trees (18, 25). In the Black Hills of South Dakota, Cryan et al. (13) found that, on average, roost tree plots contained more snags than random plots and that roost trees were of significantly greater diameter than random snags. Johnson et al. (25) found that maternity colonies in the Central Appalachians responded favorably to prescribed fire due to the creation of large-diameter snags and canopy gaps; Perry et al. (38) saw a similar preference for roosting in mature forest stands that had been thinned by forestry. Northern Myotis may form smaller colonies in order to utilize smaller trees (11). The roosting areas of females have been found to be about six times larger than those of males (6). Females have been found to change roost sites every two days or so (2, 9, 11, 16, 26), with six to 2,000 meters or more between roosts (2, 9, 43). Furthermore, members of a colony may roost in multiple trees on a given day in a fission-fusion social dynamic (19). For these reasons, maintaining a network of roost trees is important to the species (18, 19, 21, 22).

While tree roosts are preferred, Northern Myotis will occasionally use buildings and other man-made structures within close proximity to natural habitat (2, 3, 9, 14, 20, 21, 33, 43). However, with respect to the statewide habitat mapping for this species, we have decided to *exclude* structural Land Use/Land Cover patch types (i.e. Residential LULCs and bridges) because their use by bats is so incidental relative to the broad coverage of these patch types across the state. A special provision (4(d) rule) of the Endangered Species Act listing for Northern Myotis aims to avoid undue burden on citizens by allowing, among other things, for the removal of bats from human structures; this rule further marginalizes the need for structural “habitats” to be mapped for Northern Myotis. Homeowners and managers should still follow State guidelines when conducting bat exclusion work, regardless of the bat species present.

Northern Myotis are agile fliers and often forage for insects in the cluttered, closed-canopied forest interior (7, 10, 11, 21, 35, 42, 46), especially over small woodland pools and forest streams (4, 8, 9, 17, 20, 21, 25, 27, 34, 37, 39, 42) and along paths and forest edges (9, 20, 23, 25, 34, 39) and rights-of-way (31). Huie (24) found that Northern Myotis was the most abundant bat species foraging over constructed woodland pools within large, forested landscapes in Kentucky. (By contrast, Jung et al. (26) found that Northern Myotis in their central Ontario, Canada study rarely foraged over water but preferred to forage in

old-growth white pine stands.) Northern Myotis also forage along hillsides and ridges (34, 41b). They do not appear to forage over open areas such as agricultural lands (21) or the centers of clearcuts (23, 35). They are known for gleaning, or capturing prey from foliage (9). In West Virginia, Carter et al. (12) found that Coleoptera (42.3%) and Lepidoptera (31.1%) dominated their diet. In the Greater Fundy Ecosystem, New Brunswick, Canada, researchers found that Northern Myotis foraged in forest types proportionate to their availability, and that the females' foraging areas were 3.4 times larger than the males' (6). Roost sites have been found to average 600 meters (9) to >1,000 meters (5, 21, 43) from foraging/capture sites.

Northern Myotis hibernate in caves and abandoned mines (1, 9, 27, 44, 45), generally within 56 km of their summer habitats (9). Males and females begin arriving at hibernacula in late July or August, where they engage in swarming, mating, and feeding before settling in for hibernation by October or early November (9). In the central Appalachians, Northern Myotis have been found to use caves and mines as night roosts during the summer and fall, and to remain active later into October than other bat species (1). Northern Myotis typically return to the same hibernacula each year, though not always in sequential years, and they may move between sites during the winter (9). They prefer to cluster in deep crevices within hibernation sites (9). The bats emerge from hibernation around April, depending on environmental factors, and return to their summer ranges in May.

The Contiguous Area patch type is used to value suitable Northern Myotis habitat from the LULC classes above, within and beyond each documented Species Occurrence Area (SOA). Northern Myotis SOAs primarily include netting/trapping locations, sightings during hibernation surveys, and roost locations discovered through radio-telemetry. The Contiguous Area patch type, dissolved to integrate contiguous habitats, appropriately values both foraging and roosting habitats associated with the documented SOAs, as foraging can occur a considerable distance from a colony's network of roosts.

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Land Use Land Cover Selections and Patch Type Justifications

Silver-haired Bat

BIOPID 334

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	6
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Dissolved	6
1440	AIRPORT FACILITIES	Dissolved	28
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	2
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	2
1499	STORMWATER BASIN	Dissolved	27
1710	CEMETERY	Dissolved	2
1711	CEMETERY ON WETLAND	Dissolved	2
2100	CROPLAND AND PASTURELAND	Dissolved	1,2
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	9
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	1,2
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,6,11,14,20,25,27
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	2,6,11,14,20,25,27
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3,7,8,9,11,13,14,16,20,24,26

4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	<i>3,7,8,9,11,13,14,16,20,24,26</i>
4230	PLANTATION	Dissolved	<i>13</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>13,14,16,17,20,23,26,29</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>13,14,16,17,20,23,26,29</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>6,14,17,20,23,26,29</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>6,14,17,20,23,26,29</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1,2,6</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>27</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>27</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>27</i>
5100	STREAMS AND CANALS	Dissolved	<i>6,14,27</i>
5200	NATURAL LAKES	Dissolved	<i>2</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>2</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>6,27,28</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>27,28</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>27</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>27</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>27</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>6,27</i>

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>27</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>10</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>6,27,28</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>27,28</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels for Silver-haired Bat tracked in the Biotics Database, as the available information on this species do not suggest that habitat use within New Jersey should vary significantly between the active and inactive seasons or between sexes or age classes.

Silver-haired Bats are a tree-roosting species mainly associated with coniferous (3, 7, 9, 11, 13, 14, 16, 20, 24, 26) and mixed-wood (17, 20, 23, 29) forests, including plantations (13), coastal plain forests (16), and managed stands (9, 13) of different sizes and ages. Deciduous forests are used as well (2, 6, 11, 14, 27). Preference is shown for older forests (9, 11, 29, 32), where larger trees and higher snag densities are found (20).

Silver-haired Bat maternity colonies predominantly roost in tree cavities such as woodpecker holes (3, 8, 13, 17, 20, 23); most often in trees of declining condition or in early stages of decay (3, 8, 9, 11, 29). Maternity roost trees are typically >30 cm in diameter (9, 20) and taller than those around them, with fairly open understory and sun exposure (3, 8, 9, 11), and sometimes located along the edges of clearings (2). Males and non-reproductive females roost beneath loose bark (3, 8, 13, 20, 24), in splits or cracks in tree trunks (2, 3, 8, 13), and in other narrow tree crevices (2, 8, 13, 20, 24). Roost-switching occurs regularly throughout the active season (4, 11, 30) in correlation with roost availability (4).

Silver-haired Bats forage for insects in a variety of forested and forest-proximate habitats (27), such as above the forest canopy (5, 17), through the understory (7, 27), in riparian habitats (6, 14, 27, 29, 31), and over a wide range of water sources (2, 3, 9, 10, 13, 14). They have also been acoustically detected in urban areas, including above green roof structures in New York City (22).

Silver-haired Bats are one of three New Jersey bat species that migrate south for winter, traveling perhaps hundreds or thousands of kilometers (12, 25), though little is known about their migratory pathways or wintering locations. Winter records are known from the eastern oak region of the U.S. (25) and from southern New Mexico (12). Migrating Silver-haired Bats have been found to follow shorelines (2, 21) and to cross expanses of open water (21). It is worth noting that migratory bats are vulnerable to encounters with wind energy facilities along their migration routes (1, 5, 15), particularly in late summer through early autumn and along forested ridgetops in the eastern U.S. (19). More than 600,000 bats are estimated to have been killed by turbines in the contiguous U.S. in 2012 alone (15).

There are occasional reports of Silver-haired Bats found hibernating in caves, mines, and trees (12, 18), in rock crevices and under tree roots (25, 26), and other reports from northern latitudes during winter (28). South-facing topography was an important factor in winter roost selection by Silver-haired Bats in one study from Arkansas (26).

The Contiguous Area patch type is used to value suitable Silver-haired Bat habitat from the LULC classes cited, within and contiguous to each documented Species Occurrence Area (SOA). Silver-haired Bat SOAs are primarily from netting/trapping locations, professionally-vetted acoustic survey recordings, and occasional confirmed reports from the public and from local/state health departments. The Contiguous Area patch type, dissolved to integrate contiguous habitats, appropriately values both foraging and roosting habitats associated with the documented SOAs, as foraging can occur a considerable distance from roosts.

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Land Use Land Cover Selections and Patch Type Justifications

Tricolored Bat

BIOPID 335

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	2,15
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Dissolved	2,13,15
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	6,19,27
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	6,15,19,27
1499	STORMWATER BASIN	Dissolved	6
1710	CEMETERY	Dissolved	6,19
1711	CEMETERY ON WETLAND	Dissolved	6,19
2100	CROPLAND AND PASTURELAND	Dissolved	6,26
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	4,6
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	2,19
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	6,19
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	6,15,19,21
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	2,3,6,15,17,19,20,21,22,23,27,29,30,33
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	13,19,20,21
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	7,13,14,17,19,20

4230	PLANTATION	Dissolved	<i>19,20</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	<i>13,19,20,21</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	<i>7,13,19,20,21,27</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	<i>15,19,20,21</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	<i>2,3,7,15,19,20,21</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>2</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>2</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>2,14</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>2,14</i>
5100	STREAMS AND CANALS	Dissolved	<i>1,6,7,12,13,18,20,27</i>
5200	NATURAL LAKES	Dissolved	<i>4,28</i>
5300	ARTIFICIAL LAKES	Dissolved	<i>4,28</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>10,27</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>10,14</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>10,14</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>2</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>2,14</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>2,14</i>

6240	HERBACEOUS WETLANDS	Dissolved	<i>4,6</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>10,27</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>10,14</i>
7300	EXTRACTIVE MINING	Dissolved	<i>2,3,4,5,13,22,24,25,26,34</i>

Land Use - Land Cover Selection and Patch Type Rationale

The Land Use/Land Cover selections apply to all feature labels for Tricolored Bat (formerly Eastern Pipistrelle, *Pipistrellus subflavus*) tracked in the Biotics Database, as the available information on this species do not suggest that habitat use should vary significantly between the active and inactive seasons or between sexes or age classes.

Tricolored Bats inhabit forested environments of various types (2), including deciduous/hardwood (2, 15, 17, 19, 20, 21, 22, 23, 27), pine-dominated (14, 17, 19, 20), mixed (2, 7, 19, 21, 27), upland (2, 30) and bottomland (10, 27) forests. No forest types are significantly avoided (19), and interspersed of diverse forest patch types is ideal (21). Tricolored Bats prefer mature stands (18, 19, 21, 27) with large-diameter trees (6, 17, 19, 27). Managed forests such as thinned or group-selection stands are among those used (19), although large-scale thinning has a negative correlation with Tricolored Bat presence (21).

Tricolored Bats roost in the mid-story of trees (19, 20, 29, 33) - particularly Oaks (*Quercus spp.*) (2, 17, 23, 27, 29, 30, 33) and Hickories (27) - in clusters of dead or living leaves (7, 17, 20, 22, 23, 27, 29, 30) containing little to no woody debris (30). Pine needles (20) and squirrel's nests (29) are also sometimes used. These roosts offer a stable, insulated microclimate as well as camouflage from predators (23). Roosts are generally found near permanent water sources (33), especially in wooded riparian corridors along rivers and wide, slow-moving streams (1, 6, 7, 12, 13, 18, 27). Roosts are often located near the forest edge (6, 18, 19). Tricolored Bats occasionally roost in rock crevices (7), buildings (7, 13, 15, 16, 22, 31, 35), bridges (8, 9, 13) or culverts (26) when suitable natural options are lacking (16).

Tricolored Bats forage nocturnally on insects, using echolocation to navigate. They prefer to forage over open water (4), in riparian habitats (4, 6, 13, 18, 20, 27, 30), and high over open areas (4) including pastures and farm ponds, as long as trees are close by (6). A Tricolored Bat's home range for roosting and foraging is generally within a 2.5 km radius (27).

From late fall through early spring, Tricolored Bats hibernate in caves and abandoned mines (2, 3, 4, 5, 13, 22, 24, 25, 26, 34), preferably those with little to no air flow (24), stable (34) higher temperatures (3, 25), and higher humidity (25). Tricolored Bats tend to roost solitarily in hibernacula and will make use of smaller caves than most other species in the region (2), though they may also be found in large congregations with other species, such as *Myotis* bats (4). Their migrations between summer habitats and winter hibernacula may be latitudinal or north-south and may vary in distance by sex (11). Migrating Tricolored Bats may cross large water bodies, such as Lake Erie (28).

The Contiguous Area patch type is used to value suitable Tricolored Bat habitat from the LULC classes cited, within and contiguous to each documented Species Occurrence Area (SOA). Tricolored Bat SOAs are primarily from netting/trapping locations, sightings during hibernation surveys, professionally-vetted acoustic survey recordings, and roost locations discovered through radio-telemetry. The Contiguous Area patch type, dissolved to integrate contiguous habitats, appropriately values both foraging and roosting habitats associated with the documented SOAs, as foraging can occur a considerable distance from roosts.

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Land Use Land Cover Selections and Patch Type Justifications

American Brook Lamprey *BIOPID* 367 *REGION* Statewide *PATCH TYPE* SC Stream Centerline

LU20 *LABEL 20* *LULC TREATMENT* *CITATIONS*

8888 STREAM CENTERLINE Undissolved *1,2,3*

Land Use - Land Cover Selection and Patch Type Rationale

American Brook Lamprey occur primarily in streams that have soft sediment, organic matter, low water velocity, and shallow depths (Beamish and Lowartz, 1996). During the ammocete stage, which can last up to four or five years, they spend most of their time buried in the substrate of their natal stream, filter-feeding upon detritus, algae, and organic matter (Hardisty and Potter 1971). Due to their presence in both streams or lakes/ponds, stream centerlines and waterbody polygons were used to represent suitable habitat.

Stream segments intersected by an American Brook Lamprey SOA, were valued for that SOA. All valued streams were buffered by 1 km upstream and downstream. The 1 km distance was chosen as a conservative buffer estimate and based on literature review of movement and dispersal patterns of American Brook Lamprey. NatureServe mapping guidance state that if there are two occurrences within 10 km of each other these occurrences should be considered as part of the same local population regardless of habitat quality and stream segments between those occurrences were valued. Stream segments, 1 km upstream of tributaries that exist in between two occurrences, were also valued regardless of habitat quality. Dams lacking a suitable fishway, a high waterfall, and upland habitat are considered barriers and therefore the extent of stream valued was limited (Hammerson 2004). The extent of habitat valued was limited in a downstream direction when an SOA, originating upstream, intersected a lake or pond. The lake or pond represents a change in habitat or habitat that is atypical of American Brook Lamprey occurrence. SOAs representing American Brook Lamprey occurrences in lakes or ponds were valued for that polygon representing the lake or pond. Stream segments that represented inlets or outlets, associated with valued waterbody polygons, were valued 1 km upstream of inlets or 1 km downstream of outlets.

Some stream centerline data overlapped American Brook Lamprey SOA data that occurred in proximity (e.g. in another drainage area), but not related to a documented occurrence. It was necessary to manually remove these segments.

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Land Use Land Cover Selections and Patch Type Justifications

Bog Turtle

BIOPID 206

REGION Statewide

PATCH TYPE Contiguous Area *

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1-4,*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	1-4,*
1711	CEMETERY ON WETLAND	Dissolved	1-4,*
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Dissolved	1-4,*
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Dissolved	1-4,*
2100	CROPLAND AND PASTURELAND	Undissolved	4,*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	4,*
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	4,*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	4,*
2300	CONFINED FEEDING OPERATIONS	Undissolved	4,*
2400	OTHER AGRICULTURE	Undissolved	4,*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2,4,*
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Gap Elimination	1,2,4,*
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2,4,*
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,4,*

4230	PLANTATION	Undissolved	1,2,4,*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,2,4,*
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,4,*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,2,4,*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,4,*
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1,2,4,*
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1,2,4,*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1,2,4,*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2,4,*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2,4,*
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1,2,4,*
6111	SALINE MARSHES (LOW MARSH)	Dissolved	1-4,*
6112	SALINE MARSHES (HIGH MARSH)	Dissolved	1-4,*
6120	FRESHWATER TIDAL MARSHES	Dissolved	1-4,*
6130	VEGETATED DUNE COMMUNITIES	Dissolved	1-4,*
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Dissolved	1-4,*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1-4,*
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1-4,*
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1-4,*

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-4,*</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-4,*</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-4,*</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-4,*</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>1-4,*</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Dissolved	<i>1-4,*</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-4,*</i>
6500	SEVERE BURNED WETLANDS	Dissolved	<i>1-4,*</i>
7430	DISTURBED WETLANDS (MODIFIED)	Dissolved	<i>1-4,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

The bog turtle (*Glyptemys muhlenbergii*) is a habitat specialist that occupies wetlands with certain vegetative, soil, and hydrological characteristics, as well as adjacent uplands (Chase et al. 1989, Ernst and Lovich 2009). The life history of the bog turtle is somewhat unique in that it spends the majority of the year within the wetland complex and often does not venture for long periods of time into the adjacent uplands. Therefore, identifying wetlands that support bog turtles is critical in maintaining the integrity of the populations in the state.

Due to the discreet nature and small size of some bog turtle wetlands within the larger landscape context, an analysis of this preliminary mapping methodology revealed that habitat associated with entire bog turtle colonies was not being valued. Known wetlands where bog turtles occur were mapped as non-wetland land cover types at times. In other cases, bog turtle colonies exist in non-contiguous wetlands and are therefore isolated (e.g., a small "island" wetland surrounded by uplands) to a point where all the remaining wetlands comprise the entirety of the bog turtle colony. Because illegal collection is still a major threat to this species, ENSP and the USFWS were concerned that such mapping would reveal exact location information that could be mis-used by collectors.

To address the issue of habitat not being identified correctly by the LULC, cases where core bog turtle colonies were the only wetlands identified in the surrounding landscape (and thus dangerously revealing precise location information), and to capture associated uplands bog turtles are now known to frequent, a patch type Contiguous Area model is used to value critical habitat. Upland LULC types are dissolved only when they intersect the SOA to ensure these critical habitats are captured adjacent to documented occurrences.

The initial result of the patch type Contiguous Area model revealed gaps left in the mapping of upland LULC classes because they were located outside of the SOA. We added back into the model any of the uplands initially selected to fill these discrepancies. Upland class 4120 was also added only to fill gaps in the model when it was discovered that some significant portions of occupied bog turtle habitat would not have been mapped without this inclusion.

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- * ENSP biologist expert opinion - B. Zarate

Land Use Land Cover Selections and Patch Type Justifications

Eastern Copperhead

BIOPID 44

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	3,6
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3,4,5,6
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	3,6
4230	PLANTATION	Dissolved	*
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	3,4,5,6
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	3,6
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	6
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	2,5
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	3
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	*
6210	DECIDUOUS WOODED WETLANDS	Dissolved	2,6
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	2,6, *
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	2,6, *
6240	HERBACEOUS WETLANDS	Dissolved	2,6, *

6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>2,6</i>
6500	SEVERE BURNED WETLANDS	Dissolved	<i>*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1,3,4,5</i>
7300	EXTRACTIVE MINING	Dissolved	<i>3</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>*</i>

Land Use - Land Cover Selection and Patch Type Rationale

There is a paucity of literature regarding eastern copperhead habitat use. The Land Use-Land Cover (LULC) selections apply to the eastern copperheads (*Agkistrodon contortrix*) across life history stages (hibernation, foraging, gestation, basking, shedding, etc.).

Copperheads' overwintering hibernacula, gestation sites, birthing rookeries and basking habitats are commonly associated with open (or partially open) rocky areas (talus, ridge, boulder fields) (Reinert 1984, Smith 2007) and Christensen (2022) additionally documented females gestating in birthing tip-up mounds and artificial, woody debris piles. Eastern copperheads use upland forests for foraging and travel, preferring more open canopies (i.e., <50% canopy closure) (Reinert 1984, Smith 2007, Smith pers. comm. 2011) with gravid females relying upon sparsely forested, "very rocky sites" with "very sparse canopy" closure (Reinert 1984). Forests with limited sunlight infiltration (e.g., greater than 50% canopy closure or containing dense ground cover; a feature not currently distinguishable in GIS data layers) are considered less optimal (or not as preferable) but are likely used as corridors between optimal habitats (Smith pers. comm. 2011). "Plantations" were selected because they resemble natural forested habitat in northern New Jersey and provide a similar microclimate, food source for prey species, travel corridors, and/or shelter/cover from predators and/or the sun (Schantz expert opinion). Additional open habitats such as old field habitats (<25% brush covered) and more open upland deciduous scrub/shrub habitats are used for thermoregulation, cover/shelter and foraging (Schantz expert opinion, Smith pers. comm. 2011). Deciduous-dominated forest and scrub-shrub wetlands and herbaceous wetlands were selected because these habitats are not avoided (Mitchell 1994, Schantz expert opinion, Smith pers. comm. 2011) and copperheads are commonly reported foraging/hunting along wetland edges (Schantz expert opinion). The following LULCs warrant clarification:

- LULC 1211 (military installations): Some LULC "military installations" categories include relatively large patches of natural habitats adjacent to forest tracts that are suitable for and used by eastern copperheads (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021, Schantz expert opinion).
- LULC 7600 (undifferentiated barren lands): Within this snake's range, these areas include sparsely vegetated, open areas copperheads may use for basking and foraging, and gestation and birthing if suitable rock outcrops and/or debris (e.g., decaying logs, vegetative debris piles) are present (Schantz expert opinion).

The Contiguous Area patch type is most appropriate for this species as the eastern copperhead has a relatively large activity range requiring a mosaic of habitat types to fulfill life history requirements. In addition, individuals from a local population may travel beyond the specified range from the identified critical habitat feature (i.e., overwintering hibernacula) either as part of their personal home range or as males disperse in search of females from other populations. This patch type will capture suitable habitat associated with a documented critical habitat feature and/or random observation, more accurately representing the habitat used by any local population and/or individual, respectively.

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- * ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Eastern Hog-nosed Snake

BIOPID 308

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	*
1420	RAILROADS	Dissolved	*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	6
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	6
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,3,4,5,7
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	6
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,3,4,5,6,7
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	6
4230	PLANTATION	Dissolved	4,5,7,9
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	2,3,4,5,7
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	5,6
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	2,3,4,5,7
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	6
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	2,3,7,9

4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	<i>7,9</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>6,7,9</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>7,9</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>10</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>6,9</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>6,9</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>9</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>9</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>9</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>9</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>6,9</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>9</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>9</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>9</i>
6500	SEVERE BURNED WETLANDS	Dissolved	<i>10</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>12,*</i>
7300	EXTRACTIVE MINING	Dissolved	<i>*</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>*</i>

Land Use - Land Cover Selection and Patch Type Rationale

Eastern hog-nosed snakes (*Heterodon platirhinos*) are found statewide using a variety of habitats ranging from coniferous, sandy habitats of the pine barrens, forest edge and forest-grassland ecotones, and fields to the geomorphic features among the deciduous and mixed forests of the northern region (Plummer and Mills 2000, Hammerson 2007, Lagory et al. 2009, Goulet et al. 2015, Vanek 2017, NatureServe 2023, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021, Zappalorti pers. comm., Schantz expert opinion). "Nesting may occur a few inches below the surface or in rotting wood" (NatureServe 2023) but can also occur among the soils found within rock crevices and outcrops (Zappalorti pers. comm.). The majority of the LULC choices made for eastern hognose snake represent the habitat types most described in the literature along with areas of documented occurrences in New Jersey. The following LULCs warrant clarification:

- LULC 1211 (military installations): Some LULC "military installations" categories include relatively large patches of natural habitats suitable for and used by various snake species (Schantz expert opinion).
- LULC 1420 (railroad facilities): While snakes may bask along active railroad tracks, this LULC was selected to capture inactive railroad tracks and the sparsely vegetated, loose-soil areas to either side of the tracks. These areas provide suitable basking and nesting habitat for the eastern hog-nosed snake, shedding stations if shelter items are present (e.g., old railroad ties, wood debris, etc.) are present (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program. 2021), and potential wintering dens where there is subterranean access (Schantz expert opinion).
- LULC 4500 (severe burned upland vegetation) and LULC 6500 (severe burned wetland vegetation): The initial barren landscape may increase the hog-nosed snake's risk of predation and/or exposure to extreme temperatures. However, during the early stages of regeneration when these areas are sparsely vegetated (and prior to potential reclassification of the sites within the LULC coverage), hog-nosed snakes will forage for toads within burned upland areas and frogs and salamanders within burned wetlands (Zappalorti pers. comm.).
- LULC 7300 (extractive mining): Hog-nosed snakes may use the exposed talus and fissures of rock quarries for various life history requirements including, but not limited to, overwintering and/or nesting and the sandy, sparsely vegetated habitat within and/or surrounding sand pits for basking and/or nesting (Schantz expert opinion).
- LULC 7600 (undifferentiated barren lands): These areas include sparsely vegetated, open areas hog-nosed snakes may use for basking, nesting, and foraging (Schantz expert opinion).

Literature and radio-telemetry studies regarding activity ranges for the hognose snake are scant and none are specific to NJ. Published literature shows the activity ranges of the hognose snake vary greatly from just under 3.0-ha to nearly 210-ha (Plummer and Mills 2000, Lagory et al. 2009, Robson and Blouin-Demers 2013, Goulet et al. 2015, Buchanan et al. 2017, Vanek 2017). Buchanan et al. (2017) reported females had a larger mean activity range of over 61-ha while males' mean activity range was just over 35-ha.

In order to capture nesting and denning locations, along with the associated foraging habitat, for this species a patch type Contiguous Area approach is chosen to best represent the eastern hog-nosed snakes' habitat needs and usage. Patch type Contiguous Area is the best option for this species because this patch type captures large contiguous patches of habitat and therefore accounts for the potential home range requirements of hog-nosed snakes while including the additional habitat needed for individuals to disperse and interact with other local populations.

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- * ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Eastern Kingsnake

BIOPID 281

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	*
1420	RAILROADS	Dissolved	1
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	1,4
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	3,4
2100	CROPLAND AND PASTURELAND	Dissolved	3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	1,4
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	3
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	1,3
2400	OTHER AGRICULTURE	Dissolved	1,4
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3,5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	3,4
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3,4,5
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	3,4
4230	PLANTATION	Dissolved	3,5

4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	3,5
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	3,4
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	3,5
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	3,4
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	3,4
4411	PHRAGMITES DOMINATE OLD FIELD	Dissolved	3
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	5
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	5
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	5
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	5
6210	DECIDUOUS WOODED WETLANDS	Dissolved	3
6220	CONIFEROUS WOODED WETLANDS	Dissolved	3,4
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	3,4,5
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	3,5
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	3,5
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	3,5
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	3,5
6240	HERBACEOUS WETLANDS	Dissolved	3
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	3

6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>3,4</i>
6500	SEVERE BURNED WETLANDS	Dissolved	<i>6</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

Eastern kingsnakes (*Lampropeltis getula*) are found in a wide variety of habitats including early successional fields, old fields, and coniferous and deciduous forests (Wund et al. 2007, NatureServe 2023, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021). Like other snake species, kingsnakes overwinter in underground dens and will nest in decaying logs and debris piles (MacGowan et al. 2009). The following LULCs warrant clarification:

- LULC 1211 (military installations): Some LULC “military installations” categories include relatively large patches of natural habitats suitable for and used by various snake species (Schantz expert opinion).
- LULC 1420 (railroad facilities): While snakes may bask along active railroad tracks, this LULC was selected to capture inactive railroad tracks and the sparsely vegetated, loose-soil areas to either side of the tracks. These areas provide suitable basking, nesting, and shedding habitat for the eastern kingsnakes, particularly where they intercept wetlands (Bunnell pers. comm.).
- LULC 1463 (upland rights-of-way, undeveloped): These areas are often maintained in southern New Jersey for low growth vegetation, some areas sparsely vegetated with barren/sandy openings while other areas are densely vegetated. Both provide suitable habitat for the eastern kingsnake for all life history requirements (i.e., nesting, shedding, foraging, and overwintering) (Bunnell pers. comm.).
- LULC 2140 (agricultural wetlands, modified): These areas include, but are not limited to, active and abandoned cranberry bogs, i.e., suitable habitat for eastern kingsnakes to forage and shed (Bunnell pers. comm.).
- LULC 2200 (orchards/vineyards/nurseries/horticultural areas): These areas include, but are not limited to, active and abandoned cranberry bogs, i.e., suitable habitat for eastern kingsnakes to forage and shed (Bunnell pers. comm., NatureServe 2023).
- LULC 2400 (other agriculture): This includes, but is not limited to, agricultural dikes and roadways suitable for eastern kingsnake to forage, bask, shed, and nest (Bunnell pers. comm., New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021).
- LULC 4500 (severe burned upland vegetation): The initial barren landscape may increase the kingsnake's risk of predation and/or exposure to extreme temperatures. However, kingsnakes forage in uplands for other snakes regardless of whether the habitat is burned or not (Zappalorti pers. comm.). Since other snakes will be drawn to these areas, kingsnakes will be as well.
- LULC 7600 (undifferentiated barren lands): Within this snake's range, these areas include sparsely vegetated, sandy, open areas pinesnakes may use for basking, nesting, and foraging (Schantz expert opinion).

In order to capture nesting and denning locations, along with the associated foraging habitat, for this species a patch type Contiguous

Area approach is chosen to best represent the kingsnakes' habitat needs and usage. Patch type Contiguous Area is the best option for this species because this patch type captures large contiguous patches of habitat and therefore accounts for the potential home range requirements of kingsnakes while including the additional habitat needed for individuals to disperse and interact with other local populations.

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- * ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Eastern Smooth Earthsnake

BIOPID 312

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Undissolved	*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2,4
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2,4
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	1,2
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	1,2
4230	PLANTATION	Undissolved	*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,2
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,2
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,2
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,2,4
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1,2
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1,2
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,2
6210	DECIDUOUS WOODED WETLANDS	Undissolved	*

6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	*
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	*
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Literature regarding the eastern smooth earthsnake's habitat use is scant. Eastern smooth earthsnakes (*Virginia valeriae valeriae*) are found throughout New Jersey using upland forested habitats ranging from old growth to areas with past disturbance and subsequently, smaller trees, and the damp, wooded areas for their various life history requirements (Hammerson et al. 2007, Pisani 2011, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021). The majority of the LULC choices made for eastern smooth earthsnake represent the habitat types most described in the literature along with New Jersey's single documented occurrence. The following LULCs warrant clarification:

- LULC 1211 (military installations): Some LULC "military installations" categories include relatively large patches of natural habitats suitable for and used by various snake species (Schantz expert opinion).
- LULC 6220 (coniferous wooded wetlands): New Jersey's only documented observation of this species lies within coniferous wooded wetlands according to the NJ DEP's land use-land cover data. Given the literature's description of habitat use, it is likely the snake was using the damp, wooded periphery of the wetlands (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021).
- LULCs 6210 (deciduous wooded wetlands), 6251 (mixed forested wetlands-deciduous dominant), 6252 (mixed forested wetlands-coniferous dominant): In light of the snake's use of LULC 6220, it is likely the damp, wooded peripheries of hardwood and mixed forested wetlands are also used by this species (Schantz expert opinion).

The relatively small home range sizes described by NatureServe (2023) are captured using a patch type Limited Extent model to value habitat for eastern smooth earthsnakes. Patch type Limited Extent depicts the snake's limited dispersal ability by valuing selected LULCs that intersect with the Species Occurrence Area (SOA). Internal hole or gaps within the mapped area that contain polygons of selected LULC classes are also valued if they are completely enclosed by, and contiguous with, the valued area.

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* ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Green Sea Turtle *BIOPID* 259 *REGION* Statewide *PATCH TYPE* Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1,2</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1,2</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1</i>
5430	ATLANTIC OCEAN	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean, nearshore, and within some semi-enclosed tidal waters and tidal mudflats. The Atlantic Ocean, Delaware and Raritan Bays, as well as New Jersey's inland bays and other marine waters may be valued for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

Several manual edits to those marine areas coded as "Tidal Rivers, Inland Bays and Other Tidal Waters" were necessary in order to exclude marine water bodies which were either landlocked based on either aerial imagery or on the LULC dataset or were connected to larger marine areas by a passage which is unsuitable for the species to travel through.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Kemp's Ridley Sea Turtle *BIOPID* 261 *REGION* Statewide *PATCH TYPE* Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1-3</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1-3</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1</i>
5430	ATLANTIC OCEAN	Undissolved	<i>1-3</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean, nearshore, and within some semi-enclosed tidal waters and associated tidal mudflats. The Atlantic Ocean, Delaware and Raritan Bays, as well as New Jersey's inland bays and other marine waters may be valued for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

Several manual edits to those marine areas coded as "Tidal Rivers, Inland Bays and Other Tidal Waters" were necessary in order to exclude marine water bodies which were either landlocked based on either aerial imagery or on the LULC dataset or were connected to larger marine areas by a passage which is unsuitable for the species to travel through.

Literature Citations

1. NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: January 20, 2007).

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Land Use Land Cover Selections and Patch Type Justifications

Leatherback Sea Turtle BIOPID 262 REGION Statewide PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5411	OPEN TIDAL BAYS	Undissolved	1
5430	ATLANTIC OCEAN	Undissolved	1,2

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean as well as nearshore. Only the Atlantic Ocean, Delaware Bay, and Raritan Bay may be valued for this species. New Jersey's inland bays and other marine waters are not suitable for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

Literature Citations

1. NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: January 20, 2007).
2. Spotila, James R. 2004. Sea Turtles – A Complete Guide to Their Biology, Behavior, and Conservation. The John Hopkins University Press, Baltimore and London.

Land Use Land Cover Selections and Patch Type Justifications

Little Brown Skink

BIOPID 354

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	<i>1,2,3,4</i>
1150	MIXED RESIDENTIAL	Undissolved	<i>1,2,3,4</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1,2,3,4</i>
1800	RECREATIONAL LAND	Undissolved	<i>1,2,3,4</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1,2,3,4</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1,2,3,4</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1,2,3,4</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1,2,3,4</i>

4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1,2,3,4</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1,2,3,4</i>
7400	ALTERED LANDS	Undissolved	<i>1,2,3,4</i>

Land Use - Land Cover Selection and Patch Type Rationale

Little brown skinks are a terrestrial species that are commonly found in a variety of habitats, including deciduous and mixed forests, orchards, grasslands, suburbs as well as stream and pond edges (Brooks 1963; Conant and Collins 1998; NatureServe 2023). They prefer areas with abundant leaf litter, rotting logs, and loose soil. They spend nearly all of their time on the ground, rarely climbing trees or other structures. They do not hesitate to enter shallow water when pursued (Becker & Paulissen 2014; Conant and Collins 1998).

Because of their limited dispersal ability, patch type LE.1 Limited Extent was selected as the best model to capture this species' critical habitat requirements. Individual skinks have relatively small home ranges. Brooks (1963) found males to have an average home range of 62.5 yards² (52.3 m²) and NatureServe (2023) quotes home ranges from literature varying from 20 m² to 800 m².

Literature Citations

1. Becker, B. M., & Paulissen, M. A. 2012. Sexual Dimorphism in Head Size in the Little Brown Skink (*Scincella lateralis*). Herpetological Conservation and Biology, 7(2), 109–114.
2. Brooks, G.R. 1963. Population ecology of the Ground Skink, *Lygosoma laterale* [Say]. Ph.D. Dissertation, University of Florida, Gainesville, Florida, USA. 101 p.
3. Conant, R., and J.T. Collins. 1998. A Field Guide to Reptiles and Amphibians of Eastern and Central North America. 3rd Edition, expanded. Houghton Mifflin Company, New York, New York, USA. 616 p.
4. NatureServe. 2023. NatureServe Network Biodiversity Location Data accessed through NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available <https://explorer.natureserve.org/>. (Accessed: August 31, 2023).

Land Use Land Cover Selections and Patch Type Justifications

Loggerhead Sea Turtle *BIOPID* 260 *REGION* Statewide *PATCH TYPE* Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1,2</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1,2</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1</i>
5430	ATLANTIC OCEAN	Undissolved	<i>1,2</i>

Land Use - Land Cover Selection and Patch Type Rationale

This is a marine species which occurs in open ocean, nearshore, and within some semi-enclosed tidal waters and associated tidal mudflats. The Atlantic Ocean, Delaware and Raritan Bays, as well as New Jersey's inland bays and other marine waters may be valued for this species.

New Jersey's marine waters within the LULC dataset are classified into only four separate classes which, in the case especially of the "Atlantic Ocean" and "Open Tidal Bays" classes, are mapped as extremely large polygons which would be of little utility or meaning within the Landscape Project framework. Therefore, all but one marine LULC level 3 class have been mapped within the Landscape Project using an overlaid grid pattern which are coded according to "Type". This method thereby creates polygons which are much smaller and more meaningful than the originals and are consistent in the manner of their creation (i.e. without arbitrary boundaries).

For marine species, a more meaningful approach towards mapping critical habitat would utilize mapped variables such as bathymetry, slope, sea surface temperature, current direction and velocity, submerged aquatic vegetation, and/or salinity. Although such information is available for some of the state's marine waters, it is absent in other areas and/or is often incompatible across larger regions. It is this lack of a statewide multi-variable marine dataset which necessitates the current use of the gridded LULC dataset approach.

Patch type Limited Extent – Unique LULC level 3 classes are undissolved for these species. Species occurrence areas (SOA) value any of the selected LULC class polygons with which they intersect. However, the LULC classes valued by the SOA are only those LULC level 3 classes which intersect with the SOA's source feature (ex. although this species' SOA may intersect with multiple level 3 classes, only LULC polygons matching the class(es) which intersects with the source feature for that SOA will be valued). If the source feature does not occur in one of the level 3 classes to be valued by the species, then the nearest available level 3 class which may be valued by the species (or one chosen manually by the species' biologist based upon geographic or oceanographic determinants) will determine which level 3 class is valued by that source feature's corresponding SOA. If the source feature falls within two or more level 3 classes which may be valued by that species, then each of those level 3 classes may be valued by that source feature's SOA.

Source features were selected as the determinant of the LULC level 3 valuation due to the relatively large size of marine species' SOA's as well as due to New Jersey's unique coastal geography. Barrier islands, Sandy Hook, and the Cape May peninsula are barriers to direct unimpeded marine species movement between inland bays, outer bays (Raritan Bay and Delaware Bay), and the Atlantic Ocean.

Several manual edits to those marine areas coded as "Tidal Rivers, Inland Bays and Other Tidal Waters" were necessary in order to exclude marine water bodies which were either landlocked based on either aerial imagery or on the LULC dataset or were connected to larger marine areas by a passage which is unsuitable for the species to travel through.

Literature Citations

1. NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available <http://www.natureserve.org/explorer>. (Accessed: April 21, 2016).

2. Spotila, James R. 2004. Sea Turtles – A Complete Guide to Their Biology, Behavior, and Conservation. The John Hopkins University Press, Baltimore and London.

Land Use Land Cover Selections and Patch Type Justifications

**Northern Diamond-backed
Terrapin**

BIOPID 336

REGION Statewide

PATCH TYPE LE.1 Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1419	BRIDGE OVER WATER	Undissolved	<i>1, 2</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1, 2</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1, 2</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1, 2</i>
1800	RECREATIONAL LAND	Undissolved	<i>1, 2</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1, 2</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1, 2</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1, 2</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1, 2</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1, 2</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1, 2</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1, 2</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1, 2</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1, 2</i>

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1, 2
5200	NATURAL LAKES	Undissolved	1, 2
5300	ARTIFICIAL LAKES	Undissolved	1, 2
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1, 2
5411	OPEN TIDAL BAYS	Undissolved	1, 2
5412	TIDAL MUD FLAT	Undissolved	1, 2
5420	DREDGED LAGOON	Undissolved	1, 2
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1, 2
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1, 2
6120	FRESHWATER TIDAL MARSHES	Undissolved	1, 2
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1, 2
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1, 2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1, 2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1, 2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1, 2
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1, 2
6240	HERBACEOUS WETLANDS	Undissolved	1, 2
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	1, 2
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1, 2

6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1, 2</i>
7100	BEACHES	Undissolved	<i>1, 2</i>
7400	ALTERED LANDS	Undissolved	<i>1, 2</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1, 2</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1, 2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Northern Diamond-backed Terrapins spend much of their lives in open bays and tidal creeks, where they breed and forage on a variety of mollusks, crustaceans, and submerged aquatic vegetation (Egger 2016). Females emerge from brackish water for a brief period of time in search of nesting grounds on dry upland beaches (Egger 2016). Terrapins prefer nesting in areas with either little vegetation or very sparse vegetation, rather than areas heavily covered with it, preferably upland and sandy areas (Hart and Lee 2006). An ideal nesting habitat would include narrow strips of sand between estuarine water and a marsh (Hart and Lee 2006).

The LULC types selected comprise both the brackish, aquatic habitat, which includes overwinter brumation areas, and the upland nesting habitats for females, along with critical marsh habitats often utilized by the younger age classes.

Literature Citations

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Land Use Land Cover Selections and Patch Type Justifications

Northern Pinesnake

BIOPID 232

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	1,2,4,6
1420	RAILROADS	Dissolved	1,2,4,6
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	3,4
1700	OTHER URBAN OR BUILT-UP LAND	Dissolved	1,2,4,6
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	4
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	4
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	3,4,6
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	3,4,6
4230	PLANTATION	Dissolved	4, *
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1,2,3,4,6
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1,2,3,4,6
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	3,4,6
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	3,4,6
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	2,3,4,6
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	2,3,4

4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>3,4</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>3,4</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>7</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>4,6</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>4,6</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>3,4,6</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>3,4,6</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>3,6</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>3,4,6</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>3,6</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>3,6</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>3,6</i>
6500	SEVERE BURNED WETLANDS	Dissolved	<i>7</i>
7300	EXTRACTIVE MINING	Dissolved	<i>1,2,4,6</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>1,2,6</i>

Land Use - Land Cover Selection and Patch Type Rationale

Northern pinesnakes (*Pituophis m. melanoleucus*) are thought to have fairly narrow habitat requirements as they prefer well-drained, sandy soils. However, the vegetative structure is somewhat variable. New Jersey's northern pinesnakes use upland pine, pine-oak, and oak-pine forests throughout their range, as well as open fields and scrub habitats, human-disturbed areas such as abandoned buildings and railroad beds, "selectively thinned forests," emergence and forested wetlands (Burger and Zappalorti 1988, Burger and Zappalorti 1989, Burger and Zappalorti 2011, Zappalorti et al. 2014, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021). These sandy habitats make the burrowing behavior of this species possible, and pine snake nests are found almost exclusively in open areas with loose sandy soils and little vegetation (Burger and Zappalorti 1986). Pine snake dens can be found in both forested and open upland habitats (Smith and Bien 2005). The following LULCs warrant clarification:

- LULC 1211 (military installations): Some LULC "military installations" categories include relatively large patches of natural habitats suitable for and used by various snake species (Burger and Zappalorti 1988, Burger and Zappalorti 1989, Zappalorti et al. 2014, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021).
- LULC 1420 (railroad facilities): While snakes may bask along active railroad tracks, this LULC was selected to capture inactive railroad tracks and the sparsely vegetated, loose-soil areas to either side of the tracks. These areas provide suitable basking and nesting habitat for the red cornsnakes, shedding stations if shelter items are present (e.g., old railroad ties, wood debris, etc.) and potential wintering dens where there is subterranean access (Burger and Zappalorti 1988, Burger and Zappalorti 1989, Zappalorti et al. 2014, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021).
- LULC 1463 (upland rights-of-way, undeveloped): These areas are often maintained in southern New Jersey, leaving the rights-of-way sparsely vegetated with barren/sandy openings. Such habitat provides suitable basking and nesting habitat for the northern pinesnake and shedding stations if shelter items (e.g., old railroad ties, wood debris, etc.) are present (Burger and Zappalorti 2011, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021).
- LULC 4500 (severe burned upland vegetation) and LULC 6500 (severe burned wetland vegetation): The initial barren landscape may increase the pinesnake's risk of predation and/or exposure to extreme temperatures. However, during the early stages of regeneration when these areas are sparsely vegetated with barren/sandy openings (and prior to potential reclassification of the sites within the LULC coverage), they provide nesting and foraging habitat for northern pinesnakes (Zappalorti pers. comm.).
- LULC 7600 (undifferentiated barren lands): Within this snake's range, these areas include sparsely vegetated, sandy, open areas pinesnakes may use for basking, nesting, and foraging (Burger and Zappalorti 1988, Burger and Zappalorti 1989, Zappalorti et al. 2014).

In order to capture nesting and denning locations, along with the associated foraging habitat, for this species a patch type Contiguous Area approach is chosen to best represent the northern pinesnakes' habitat needs and usage. Patch type Contiguous Area is the best option for this species because this patch type captures large contiguous patches of habitat and therefore accounts for the potential home range requirements of pinesnakes while including the additional habitat needed for individuals to disperse and interact with other local populations.

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 7. Zappalorti, Robert. 2019. Personal Communication. Herpetological Associates, Inc., Pemberton, NJ.
- * ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Northern Scarletsnake

BIOPID 311

REGION Statewide

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	*
1420	RAILROADS	Dissolved	6
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,2
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,4
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,2,4
4230	PLANTATION	Dissolved	2
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1,2,3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1,2,3,4
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1,2,3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1,2,3
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	2,3
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	5
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	5

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	5
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	6
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	*

Land Use - Land Cover Selection and Patch Type Rationale

Literature regarding the northern scarletsnake's habitat use is scant. Northern scarlet snakes (*Cemophora coccinea copei*) are found in southern New Jersey and are most often associated with wooded/forested areas (Nelson and Gibbons 1972, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021). However, these snakes also use grasslands, forest-grassland ecotones, sandy, shrub habitats, and a variety of fields (Palmer and Tregembo 1970, Nelson and Gibbons 1972, Hammerson 2007, NatureServe 2023). The majority of the LULC choices made for northern scarletsnake represent the habitat types most described in the literature along with areas of documented occurrences in New Jersey. The following LULCs warrant clarification:

- LULC 1211 (military installations): Some LULC "military installations" categories include relatively large patches of natural habitats suitable for and used by various snake species (Schantz expert opinion).
- LULC 1420 (railroad facilities): While snakes may bask along active railroad tracks, this LULC was selected to capture inactive railroad tracks and the sparsely vegetated, loose-soil areas to either side of the tracks. These areas provide suitable basking and nesting habitat for the northern scarletsnake, shedding stations if shelter items are present (e.g., old railroad ties, wood debris, etc.) and potential wintering dens where there is subterranean access (Zappalorti pers. Comm).
- LULC 1463 (upland rights-of-way, undeveloped): These areas are often maintained in southern New Jersey, leaving the rights-of-way sparsely vegetated with barren/sandy openings. Such habitat provides suitable basking and nesting habitat for the northern scarlet snake and shedding stations if shelter items (e.g., old railroad ties, wood debris, etc.) are present (Schantz expert opinion).
- LULC 4500 (severe burned upland vegetation): The initial barren landscape may increase the northern scarletsnake's risk of predation and/or exposure to extreme temperatures. However, during the early stages of regeneration when these areas are sparsely vegetated with barren/sandy openings (and prior to potential reclassification of the sites within the LULC coverage), it provides nesting habitat for northern scarletsnakes (Zappalorti pers. comm.).
- LULC 7600 (undifferentiated barren lands): Within this snake's range, these areas include sparsely vegetated, sandy, open areas scarletsnakes may use for basking, nesting, and foraging (Schantz expert opinion)

No radio-telemetry studies regarding activity ranges for the scarlet snake exist. As such, we have relied on NatureServe's (2023) reference to studies on other colubrid species. NatureServe's (2023) inferred minimum extent of habitat use of 500-m (radius) results in an activity range of approximately 78.5-ha (194-ac). Patch type Contiguous Area is the best option for this species because it captures larger areas of habitat than some of the other patch type models. This is particularly important for a fossorial species like the northern scarlet snake, which may be underrepresented by the species occurrence data, because the model values enough habitat around each species occurrence area to capture the critical nesting, denning, and foraging habitat for northern scarlet snakes even if occurrence data is lacking.

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- * ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Queensnake

BIOPID 278

REGION Statewide

PATCH TYPE CA*.4 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Riparian Dissolved	<i>1</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Riparian Dissolved	<i>*</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>*</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1</i>
4230	PLANTATION	Undissolved and Riparian Dissolved	<i>*</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Riparian Dissolved	<i>1</i>

4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved and Dissolved	Riparian	*
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved and Dissolved	Riparian	*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Dissolved	Riparian	*
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Dissolved	Riparian	*
5200	NATURAL LAKES	Undissolved and Dissolved	Riparian	<i>1</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved and Dissolved	Riparian	<i>1,2</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Dissolved	Riparian	<i>1,2</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Dissolved	Riparian	<i>1</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Dissolved	Riparian	<i>1</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Dissolved	Riparian	<i>1</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved and Dissolved	Riparian	<i>1</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Dissolved	Riparian	<i>1</i>
6240	HERBACEOUS WETLANDS	Undissolved and Dissolved	Riparian	<i>1</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved and Dissolved	Riparian	*
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved and Dissolved	Riparian	<i>1</i>

6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Dissolved	Riparian	<i>I</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved and Dissolved	Riparian	<i>I,*</i>

Land Use - Land Cover Selection and Patch Type Rationale

Scientific studies on the queensnake (*Regina septemvittata*) are scant with most on-line sources (e.g., state species' "fact sheets") highlighting the same habitats as NatureServe (2023) including various types of wetlands, riparian habitats, and streams. These snakes also travel into upland habitats, away from water, using shelters such as rocks and logs (NatureServe 2023). The LULC choices made for this snake represent the habitat types most described by NatureServe (2023) along with areas of documented occurrences in New Jersey.

The Queensnake has a relatively small home range size as described by NatureServe (2023). As a water-dependent species, queensnakes also value riparian habitats beyond the intersect with the Species Occurrence Area (SOA). These riparian habitats include non-urban LULC types that may otherwise not be used beyond the riparian area. Such habitat is critical for basking and resting areas, and also as a dispersal corridor to other preferred habitat types (Schantz expert opinion). These riparian LULC selections are dissolved while upland habitats will be undissolved, so water-adjacent habitats beyond the SOA are captured in the model while limiting upland habitats to those deemed most critical by the SOA. As such, this species is assigned patch type Contiguous Area which allows for this distinction between riparian and upland habitat use and does not value habitat beyond the size of the local population.

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- * ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Red Cornsnake

BIOPID 254

REGION Statewide

PATCH TYPE CP*.3 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Undissolved and Adjacent Undissolved	*
1420	RAILROADS	Undissolved and Adjacent Undissolved	5, *
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved and Adjacent Undissolved	3,5,6
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	5
2100	CROPLAND AND PASTURELAND	Undissolved and Adjacent Undissolved	5
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	1
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Adjacent Undissolved	5, *
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	4
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	5
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	2,3,4,5,6
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	2,3,4,5,6

4230	PLANTATION	Undissolved and Adjacent Undissolved	2,3,6
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	2,3,4,5,6
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	2,3,4,5,6
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	*
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	5
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved and Adjacent Undissolved	2,3,4,5,6
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	*
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	2,3,4,5,6
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	2,4
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved and Adjacent Undissolved	*
6210	DECIDUOUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	*
6220	CONIFEROUS WOODED WETLANDS	Undissolved and Adjacent Undissolved	5
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved and Adjacent Undissolved	2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	*
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved and Adjacent Undissolved	2,5

6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2,5
6240	HERBACEOUS WETLANDS	Undissolved and Adjacent Undissolved	5
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved and Adjacent Undissolved	2,3
6500	SEVERE BURNED WETLANDS	Undissolved and Adjacent Undissolved	2, *
7300	EXTRACTIVE MINING	Undissolved and Adjacent Undissolved	5
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved and Adjacent Undissolved	*

Land Use - Land Cover Selection and Patch Type Rationale

Red cornsnakes (*Pantherophis guttatus*) are found in southern New Jersey using a variety of habitats including but not limited to pine-dominant and hardwood forests with sandy openings, shrublands, grasslands, coniferous-dominant shrub and forested wetlands, and herbaceous wetlands (Echternacht et al. 2016, Liguori 2003, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021, NatureServe 2023). The LULC choices made for cornsnake represent the habitat types most described in the literature along with areas of documented occurrences in New Jersey. The following LULCs warrant clarification:

- LULC 1211 (military installations): Some LULC “military installations” categories include relatively large patches of natural habitats suitable for and used by various snake species (Schantz expert opinion).
- LULC 1420 (railroad facilities): While snakes may bask along active railroad tracks, this LULC was selected to capture inactive railroad tracks and the sparsely vegetated, loose-soil areas to either side of the tracks. These areas provide suitable basking and nesting habitat for the red cornsnakes, shedding stations if shelter items are present (e.g., old railroad ties, wood debris, etc.) and potential wintering dens where there is subterranean access (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021, Schantz expert opinion).
- LULC 4500 (severe burned upland vegetation) and LULC 6500 (severe burned wetland vegetation): The initial barren landscape may increase the cornsnake’s risk of predation and/or exposure to extreme temperatures. However, during the early stages of regeneration when these areas are sparsely vegetated, they will likely provide increased foraging opportunities for the cornsnakes (Zappalorti pers. comm.).*
- LULC 7600 (undifferentiated barren lands): These areas include sparsely vegetated, open areas red cornsnakes may use for basking, nesting, and foraging (Schantz expert opinion).

Activity range studies are scant and as such, we have relied on NatureServe’s (2023) inferred minimum extent of habitat use of 500-m (radius on observations) for this species, resulting in an activity range of approximately 78.5-ha (194-ac). Preliminary mapping using different patch types resulted in over- or under-valuation of habitats. Patch type Cardinal Proximate is the best model to identify this species’ habitats by valuing habitats (LULCs) that directly intersect the Species Occurrence Area (SOA) and the same LULCs that are immediately adjacent to those habitats. Any internal holes or gaps containing polygons of selected LULC classes are also valued if they are completely enclosed by, and contiguous with, the valued area.

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- * ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Rough Greensnake

BIOPID 309

REGION Statewide

PATCH TYPE CP*.1 Cardinal-
Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved and Adjacent Undissolved	3
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved and Adjacent Undissolved	3
2100	CROPLAND AND PASTURELAND	Undissolved and Adjacent Undissolved	3
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved and Adjacent Undissolved	2
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	1,2,4,5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	2,3,4,5
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	1,3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	3
4230	PLANTATION	Undissolved and Adjacent Undissolved	2
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	1

4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>3</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>1,2,3,4,5</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved and Adjacent Undissolved	<i>2,3,4,5</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved and Adjacent Undissolved	<i>2</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	<i>2,5</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	<i>3</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved and Adjacent Undissolved	<i>2</i>
5200	NATURAL LAKES	Undissolved and Adjacent Undissolved	<i>2,3,4,5</i>
5300	ARTIFICIAL LAKES	Undissolved and Adjacent Undissolved	<i>2,3,4,5</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1,2</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1,2,3</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1,2</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1,2</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2</i>

6240	HERBACEOUS WETLANDS	Dissolved	<i>2</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1,2</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1,2,3</i>
6500	SEVERE BURNED WETLANDS	Dissolved	<i>7</i>
7300	EXTRACTIVE MINING	Undissolved and Adjacent Undissolved	<i>3</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved and Adjacent Undissolved	<i>3</i>
7500	TRANSITIONAL AREAS	Undissolved and Adjacent Undissolved	<i>3</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved and Adjacent Undissolved	<i>3</i>

Land Use - Land Cover Selection and Patch Type Rationale

Literature regarding the rough greensnake's habitat use is scant. Rough greensnakes (*Opheodrys aestivus*) are found in southern New Jersey using a variety of habitats for their various life history requirements but are typically proximate to water, i.e., within 250-meters, with some at a further distance (Plummer 1981, Plummer 1997, Semlitsch 2003, Hammerson et al. 2007, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021, NatureServe 2023). The majority of the LULC choices made for rough greensnake represent the habitat types most described in the literature along with areas of documented occurrences in New Jersey. The following LULCs warrant clarification:

- LULC 2140 (agricultural wetlands): The initial result of the patch type Cardinal Proximate model revealed gaps left in the mapping of this wetland LULC class because they were located outside of the SOA. We added this LULC back into the model to fill these discrepancies.
- LULC 5200 (natural lakes): According to the literature (Plummer 1981, Plummer 1997, NatureServe 2023), rough greensnakes use riparian habitats, including the vegetated embankments of streams and lakes. These features were also found within the 500-m radius activity range of confirmed observations (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program. 2021). The inclusion of this LULC category is to target vegetated embankments of these features.
- LULC 5300 (artificial lakes): According to the literature (Plummer 1981, Plummer 1997, NatureServe 2023), rough greensnakes use riparian habitats, including the vegetated embankments of streams and lakes. These features were also found within the 500-m radius activity range of confirmed observations (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program. 2021). The inclusion of this LULC category is to target vegetated embankments of these features.
- LULC 6500 (severe burned wetland vegetation) was selected because while the initial barren landscape may increase the rough greensnake's risk of predation and/or exposure to extreme temperatures, as these areas regenerate (and prior to potential reclassification of the sites within DEP's LULC coverage), it may improve foraging opportunities for this snake, particularly along stream edges (Zappalorti pers. comm.).

According to literature, these snakes are largely associated with aquatic systems. While Semlitsch (2003) reported snakes remaining within 30-m of aquatic habitats and Hammerson et al. (2007) reported females moving up to 75-m from aquatic habitats to nest, New Jersey data revealed most documented observations were within 250-m of aquatic habitats (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021). As of 2021, NJ Fish and Wildlife's Biotics Database had 52 confirmed observations. Of these, 26 were less than 75-m from a freshwater aquatic habitat (i.e., confirmed vernal pool, stream, or habitats assigned the LULC Type of "Water" or "Wetlands"). Eight observations were between 75- and 150-m from freshwater aquatic habitat, six were between 150- and 250-m from aquatic habitat, nine were between 250- and 450-m of aquatic habitat, and the remaining three were more than 550-m from aquatic habitats; i.e., 77% of New Jersey's documented observations were within 250-m of aquatic habitats.

These findings demonstrate that rough greensnakes use upland habitats more than previously indicated for at least foraging, traveling, and basking/resting. However, certain upland LULC types (e.g., plantations, cropland and pastureland) may not be used beyond the riparian areas or

as more than travel corridors. Patch type Cardinal Proximate dissolves the more suitable habitat polygons to accurately reflect habitat use by this species while limiting the selection of less suitable, riparian-adjacent upland habitats through the undissolved (proximate) LULC treatment.

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- * ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Smooth Greensnake

BIOPID 310

REGION Statewide

PATCH TYPE CP.*6 Cardinal-Proximate

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Undissolved	*
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved and Adjacent Dissolved	<i>2</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>2</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved and Adjacent Dissolved	<i>1</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,2</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved and Adjacent Dissolved	<i>1</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved and Adjacent Dissolved	<i>1</i>

6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved and Adjacent Dissolved	<i>1</i>
6240	HERBACEOUS WETLANDS	Dissolved and Adjacent Dissolved	<i>1,2</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved and Adjacent Dissolved	<i>1</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>2</i>

Land Use - Land Cover Selection and Patch Type Rationale

Scientific studies on the smooth greensnake (*Opheodrys vernalis*) are scant with most on-line sources (e.g., state species' "fact sheets") highlighting the same habitats as NatureServe (2023) including wetlands, hardwood, conifer and mixed forests, old fields and grasslands, and more (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021, NatureServe 2023). The LULC choices made for this snake represent the habitat types most described by NatureServe (2023) along with areas of documented occurrences in New Jersey.

- LULC 1211 (military installations): Some LULC "military installations" categories include relatively large patches of natural habitats suitable for and used by various snake species (Schantz expert opinion).

Because of their limited activity range (NatureServe 2023) and association with "moist" and/or aquatic habitats, patch type Cardinal Proximate is the best model to identify the species' habitats by limiting the selection of upland habitat and valuing more wetland and riparian habitats associated with each observation, more accurately reflecting the habitat used by the local population.

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- * ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Spotted Turtle

BIOPID 282

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1,2</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1,2</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1,2</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1,2</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-3</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-3</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-3</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-3</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-3</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-3</i>
4230	PLANTATION	Undissolved	<i>1-3</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-3</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-3</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-3</i>

4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-3
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-3
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-3
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-3
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-3
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-3
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-3
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,2
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1,2
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,2
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,2
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2
6240	HERBACEOUS WETLANDS	Undissolved	1,2
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	1,2
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1,2
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1,2
6500	SEVERE BURNED WETLANDS	Undissolved	1,2

Land Use - Land Cover Selection and Patch Type Rationale

The spotted turtle (*Clemmys guttata*) frequents a variety of wetland habitat types throughout its range, although terrestrial habitat use is documented (Milem and Melvin 2001, Ernst and Lovich 2009). The type of wetland that the species uses may shift seasonally causing the animal to travel regularly across fields, through forests, or employ wetlands as a corridor between preferred habitats (Joyal et.al 2001, Milam and Melvin 2001). LULC selections reflect the diverse habitat types used by this turtle.

Patch type Limited Extent was selected for the spotted turtle to concentrate valued habitats around known occurrences. Spotted turtles have small home ranges (Ernst and Lovich 2009) and this patch type accurately captures the local populations that the occurrences represent.

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Land Use Land Cover Selections and Patch Type Justifications

Timber Rattlesnake

BIOPID 45

REGION Skylands

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	3, *
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	3
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	3
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,3,7,8
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,2,3,7,8
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1,2,3,7,8
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1,2,3,7,8
4230	PLANTATION	Dissolved	*
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1,2,3,7,8
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1,2,3,7,8
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1,2,3,7,8
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1,2,3,7,8
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	*
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1,2,5,6, *
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1,2,5,6, *

4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	<i>1,2,5,6,*</i>
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	<i>*</i>
6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>3,4,*</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>3,4,*</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>3,4,*</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>3,8</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>3,8</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>3,8</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>3,8</i>
6240	HERBACEOUS WETLANDS	Dissolved	<i>8</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>3,4,*</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>3,4,*</i>
6500	SEVERE BURNED WETLANDS	Dissolved	<i>*</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Dissolved	<i>1,2,3,5</i>
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	<i>*</i>

Land Use - Land Cover Selection and Patch Type Rationale

Timber rattlesnakes (*Crotalus horridus*) of New Jersey northern montane habitats have large home ranges (Brown 1993, Schantz 2009) and occupy forested, shrub, wetland, and rocky habitats throughout their active season (Brown 1992, Brown 1993, Reinert 1984, Schantz 2009, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021). Hibernacula are commonly associated with open (or partially open) rocky areas (talus, ridge, boulder fields) (Brown 1992, Brown 1993, Martin 1992, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021) but have also been documented in small, forested rock outcrops (Schantz 2009). While rattlesnakes prefer forested habitats when they are not basking (Brown 1992, Brown 1993, Reinert 1984, Schantz 2009, New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021), gravid females rely upon sparsely forested sites with sparse canopy closure (Brown 1992, Reinert 1984). "Plantations" were selected because they may resemble natural forested habitat in northern New Jersey and provide a similar microclimate, food source for prey species, travel corridors, and/or shelter/cover from predators and/or the sun (Schantz expert opinion).

While the literature (Brown 1992 and 1993, Martin 1992) does not differentiate between upland and wetland shrub habitats, upland shrub habitats are commonly associated with hibernacula, gestation areas, birthing rookeries and basking sites for thermoregulation and additional cover in an otherwise exposed area (Michell pers. communication, Schantz expert opinion). Shrub habitats (in general) are also used for cover/shelter and foraging (Martin 1992). Schantz, 2009, documented rattlesnakes using deciduous forest, scrub/shrub wetlands, and herbaceous wetlands. Although little research exists regarding the importance of wetland habitats throughout the species' range in mountainous regions, research in northern New Jersey (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021, Schantz 2009, Schantz expert opinion) suggests these habitats are used by rattlesnakes for foraging and shedding. For this reason, forested, scrub-shrub, and herbaceous wetland habitats were selected as suitable rattlesnake habitat. In addition, old field (<25% brush covered) habitats were selected given the snakes' use of various open and edge habitats for basking, shedding, and foraging (Schantz expert opinion). The following LULCs warrant clarification:

- LULC 1211 (military installations): Some LULC "military installations" categories include relatively large patches of natural habitats adjacent to forest tracts that are suitable for and used by timber rattlesnakes (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021, Schantz expert opinion).
- LULC 4500 (severe burned upland vegetation): The initial barren landscape may increase the rattlesnake's risk of predation and/or exposure to extreme temperatures. However, during the early stages of regeneration when these areas are sparsely vegetated (and prior to potential reclassification of the sites within the LULC coverage), such areas can attract rodents, becoming foraging grounds for rattlesnakes and other snake species (Schantz expert opinion).
- LULC 6500 (severe burned wetlands): The initial barren landscape may increase the rattlesnake's risk of predation and/or exposure to extreme temperatures. However, during the early stages of regeneration when these areas are sparsely vegetated (and prior to potential reclassification of the sites within the LULC coverage), such areas can attract rodents, becoming foraging and suitable shedding grounds for rattlesnakes like forested, scrub-shrub, and herbaceous wetlands (Schantz expert opinion).

- LULC 7600 (undifferentiated barren lands): Within this snake's range, these areas include sparsely vegetated, open areas rattlesnakes may use for basking and foraging, and gestation and birthing if suitable rock outcrops and/or debris (e.g., decaying logs, vegetative debris piles) are present (Schantz expert opinion).

The Contiguous Area patch type is most appropriate for this species as the timber rattlesnake is a large activity range requiring a mosaic of habitat types to fulfill life history requirements. In addition, individuals from a local population may travel beyond the specified range from the identified critical habitat feature (i.e., overwintering hibernacula) either as part of their personal home range or as males disperse in search of females from other populations. This patch type will capture suitable habitat associated with a documented critical habitat feature and/or random observation, more accurately representing the habitat used by any local population and/or individual, respectively.

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- * ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Timber Rattlesnake

BIOPID 284

REGION Pinelands

PATCH TYPE CA.1 Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1211	MILITARY RESERVATIONS	Dissolved	7,*
1420	RAILROADS	Dissolved	4
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Dissolved	*
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	*
2140	AGRICULTURAL WETLANDS (MODIFIED)	Dissolved	4
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Dissolved	*
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	8
2400	OTHER AGRICULTURE	Dissolved	8
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,5
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	2,5
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	2,5
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	2,5
4230	PLANTATION	Dissolved	2,5
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	2,5
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	2,5

4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	2,5
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	2,5
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	4
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	4
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	4
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	4
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	8
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1,4,5,6,7
6220	CONIFEROUS WOODED WETLANDS	Dissolved	1,4,5,6,7
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1,4,5,6,7
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	4
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	*
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	4
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	4
6240	HERBACEOUS WETLANDS	Dissolved	4
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	1,4,5,6,7
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	1,4,5,6,7
6500	SEVERE BURNED WETLANDS	Dissolved	*
7600	UNDIFFERENTIATED BARREN LANDS	Dissolved	*

Land Use - Land Cover Selection and Patch Type Rationale

Timber rattlesnakes (*Crotalus horridus*) of the New Jersey Pine Barrens have large home ranges (Reinert and Zappalorti 1988a, Smith et al. 2008, New Jersey Conservation Foundation and Herpetological Associates, Inc. unpubl. data 2010) and occupy forested habitats within the Pine Barrens (Reinert and Zappalorti 1988a, Laidig and Golden 2004). Hibernacula are generally located along stream edges and cedar swamp embankments, and within the associated forested wetlands and floodplains typically bordered by and/or including Atlantic white cedar or other Pine Barrens wetland tree species (Gloyd 1978, Reinert and Zappalorti 1988a, 1998b, Zappalorti pers. comm.). The following LULCs warrant clarification:

- LULC 1211 (military installations): Some LULC “military installations” categories include relatively large patches of natural habitats suitable for and used by various snake species (Schantz expert opinion).
- LULC 1420 (railroad facilities): While snakes may bask along active railroad tracks, this LULC was selected to capture inactive railroad tracks and the sparsely vegetated, loose-soil areas to either side of the tracks. These areas provide suitable basking, nesting, and shedding habitat for the eastern kingsnakes, particularly where they intercept wetlands (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021).
- LULC 1463 (upland rights-of-way, undeveloped): These areas are often maintained in southern New Jersey for low growth vegetation, some areas sparsely vegetated with barren/sandy openings while other areas are densely vegetated. Both provide suitable habitat for the the pine barrens’ timber rattlesnake for foraging, shedding, basking, and possibly gestation and birthing if suitable debris (e.g., decaying logs, vegetative debris piles) are present (Schantz expert opinion).
- LULC 2140 (agricultural wetlands, modified): These areas include, but are not limited to active and abandoned cranberry bogs, and captures associated dikes. The pine barren’s timber rattlesnake has been documented using the bogs but also gestating on the associated dikes (New Jersey Department of Environmental Protection, Fish and Wildlife, Endangered & Nongame Species Program 2021).
- LULC 2200 (orchards/vineyards/nurseries/horticultural areas): These areas include, but are not limited to, active and abandoned cranberry bogs, i.e., suitable habitat for pine barren’s timber rattlesnake to forage, bask, shed, gestate and birth, and overwintering hibernacula (Zappalorti pers. comm.).
- LULC 2400 (other agriculture): This includes, but is not limited to, agricultural dikes and roadways suitable for pine barren’s timber rattlesnake to forage, bask, shed, gestate and birth, and for overwintering hibernacula (Zappalorti pers. comm.).
- LULC 4500 (severe burned upland vegetation): The initial barren landscape may increase the rattlesnake’s risk of predation and/or exposure to extreme temperatures. However, during the early stages of regeneration when these areas are sparsely vegetated (and prior to potential reclassification of the sites within the LULC coverage), such areas can attract rodents such as white-footed mice, becoming foraging grounds for rattlesnakes and other snake species (Zappalorti pers. comm.).

- LULC 6500 (severe burned wetland vegetation) was selected because while the initial barren landscape may increase the timber rattlesnake's risk of predation and/or exposure to extreme temperatures, as these areas regenerate (and prior to potential reclassification of the sites within the LULC coverage), it may improve foraging opportunities for this snake, particularly along stream edges (Schantz expert opinion).
- LULC 7600 (undifferentiated barren lands): Within this snake's range, these areas include sparsely vegetated, sandy, open areas rattlesnakes may use for basking and foraging, and gestation and birthing if suitable debris (e.g., decaying logs, vegetative debris piles) are present (Schantz expert opinion).

Because timber rattlesnakes have large home ranges it is important to value large contiguous habitat patches in order to capture the required gestation sites, overwintering locations, and foraging habitat for this species. For this reason, patch type Contiguous Area approach is the method that was applied to identify the suitable habitats for the pine barrens' timber rattlesnakes. This method also accounts for the additional habitat needed for individuals to disperse and interact with other local populations.

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* ENSP biologist expert opinion – K.A. Schantz

Land Use Land Cover Selections and Patch Type Justifications

Wood Turtle

BIOPID 196

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1,3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1,4-6</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1,4-6</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1,4-6</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1,4-6</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1,3</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1,3</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Riparian Undissolved	<i>1,4-6</i>
2300	CONFINED FEEDING OPERATIONS	Riparian Undissolved	<i>1,4-6</i>
2400	OTHER AGRICULTURE	Riparian Undissolved	<i>1,4-6</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,3</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,3,4</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1,4-6</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1,4-6</i>

4230	PLANTATION	Undissolved	1,4-6
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1,4-6
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1,4-6
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1,4-6
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1,4-6
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1,4-6
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1,4-6
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1,4-6
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,4-6
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1,3
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1,4-6
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1,3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1,3
6120	FRESHWATER TIDAL MARSHES	Undissolved	1,4-6
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1,3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1,3
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,3
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1,3
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1,3

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	1,3
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	1,4-6
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	1,3
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	1,3
6240	HERBACEOUS WETLANDS	Undissolved	1,3
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	1,4-6
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	1,3
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	1,3
6500	SEVERE BURNED WETLANDS	Undissolved	1,3
7100	BEACHES	Riparian Undissolved	1,4-6
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Riparian Undissolved	1,4-6
7300	EXTRACTIVE MINING	Riparian Undissolved	1,4-6
7400	ALTERED LANDS	Riparian Undissolved	1,4-6
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	1,4-6
7500	TRANSITIONAL AREAS	Riparian Undissolved	1,4-6
7600	UNDIFFERENTIATED BARREN LANDS	Riparian Undissolved	1,4-6

Land Use - Land Cover Selection and Patch Type Rationale

Aside from the eastern box turtle, the wood turtle (*Glyptemys insculpta*) is New Jersey's most terrestrial turtle, and also a stream-dependent, habitat generalist (Harding and Bloomer 1979, Kaufmann 1995). After the spring breeding period, females disperse to forage and nesting areas and both sexes frequently move great distances away from the streams during the summer months (Harding and Bloomer 1979, Kaufmann 1992).

The LULC choices made for wood turtle represent the habitat types most described in the literature along with areas of documented occurrence in New Jersey (ENSP 2010). With many of the in-state occurrences in wetlands, these areas were considered of paramount importance, while uplands offer critical nesting and foraging opportunities (Kaufman 1992). Kaufmann (1992) and Compton et al. (2002) found wood turtles to use a variety of wetland and upland land-use types adjacent and distant to stream corridors.

Because wood turtles have relatively small home ranges and are fidelic to home streams (Kaufmann 1995), habitat surrounding known occurrences (often associated with streams) are captured using patch type Limited Extent modeling. This patch type limits the amount of habitat valued distant from the original observations and takes into account the turtle's limited mobility.

As a stream-dependent species, wood turtles also value riparian habitats provided they intersect with the SOA. These riparian habitats include all non-urban LULC types. This habitat is critical as basking and resting areas, and also as a dispersal corridor to other preferred habitat types (Harding and Bloomer 1979, Compton et al. 2002). The riparian LULC selections are undissolved so only the most critical adjacent habitats are captured in the model.

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Land Use Land Cover Selections and Patch Type Justifications

Woodland Box Turtle

BIOPID 233

REGION Statewide

PATCH TYPE Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-3</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-3</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-3</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-3</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-3</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-3</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-3</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-3</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-3</i>
2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-3</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-3</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>2,4</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>2,4</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-3</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-3</i>

4230	PLANTATION	Undissolved	1-3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	1-3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	1-3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	1-3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	1-3
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	1-3
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-3
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	1-3
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	1-3
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	2,4
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	1-3
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1-3
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-3
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-3
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1-3
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1-3
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1,2
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1-3
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1-3

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1,2</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1,2</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-3</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1,2</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-3</i>
6500	SEVERE BURNED WETLANDS	Undissolved	<i>1-3</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-3</i>

Land Use - Land Cover Selection and Patch Type Rationale

The eastern box turtle (*Terrapene carolina carolina*) is New Jersey's most terrestrial turtle (Ernst and Lovich 2009). As such, it relies on a variety of habitat types to successfully complete its life cycle. There is a preference for ecotone areas and valued LULC types attempt to reflect the diverse habitats the species is known to occur in and those the literature suggests are valuable (Delia et al. 2001, Ernst and Lovich 2009, ENSP 2010).

Analyzing the state's current distribution of occurrences for box turtle determined large percentages are from wetland areas, although woodlands are well recognized as being a preferred habitat type, as well (ENSP 2010). In order to capture the state's existing records and include the upland cover types the species routinely occupies, various wetland types tangent to scrub/shrub and hardwood forests were chosen as the species' critical habitats, supported in the literature by Reagan (1974) and Delia et al. (2001).

The relatively small home range sizes and local population limits based on Stickel's work (1950) are captured using a patch type Limited Extent model to value critical habitat for eastern box turtles. Patch type Limited Extent depicts the turtle's limited dispersal ability from the home range and does not value habitat beyond the size of the local population.

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Land Use Land Cover Selections and Patch Type Justifications

10 Hectare Core Forest

BIOPID 1005 REGION Statewide

PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-23
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-23
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1-23
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-23
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1-23
4230	PLANTATION	Dissolved	1-23
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-23
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1-23
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-23
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1-23
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-23
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-23
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-23
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-23
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1-23

6220	CONIFEROUS WOODED WETLANDS	Dissolved	1-23
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	1-23
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	1-23
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	1-23
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	1-23
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	1-23
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	1-23
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	1-23

Land Use - Land Cover Selection and Patch Type Rationale

Many endangered and threatened species in New Jersey only inhabit large tracts of forest (> 10Ha). Barred owls are restricted to forested areas, ranging from swamps and riparian areas to upland regions. They prefer large, unfragmented tracts of mature and old-growth forests, typically of mixed deciduous-coniferous composition. In New Jersey, barred owls are found in old-growth hardwood, cedar swamps, and upland oak-pine forest (Mazur and James 2000) and have a mean home range of 339.47 ha (Nichols and Warner 1972, Fuller 1979, Elody and Sloan 1985). Red-shouldered hawk habitat varies from bottomland hardwood, riparian areas, and flooded deciduous swamps to upland mixed deciduous-coniferous forests. They prefer extensive forest stands (mean home range 224 ha) consisting of mature to old-growth canopy trees with variable amounts of understory (Crocoll 1994). Northern goshawks prefer large, contiguous tracts of mature forests and forested wetlands to breed (Squires and Reynolds 1997, Bosakowski and Speiser 1994), while non-breeding habitats may also include young forests, scrub-shrub habitats and ecotones between forest and open fields and agricultural lands (Squires and Reynolds 1997, Bosakowski and Speiser 1994). Bobcat home range sizes are highly variable, both geographically and intrasexually in the same geographic area particularly if suitable habitat components have a patchy distribution (Lovallo 1999). The home range size of males is generally larger than that of females, but range from 6.40-33 km², for females and 15.34-326 km² for males (Connor et al. 1999, Litvaitis et al, 1986, Lovallo and Anderson 1996, Lovallo 2000). In New Jersey, the annual home range of a male in 2002 was 121 km² with a core of 19 km² and the home range of a female in 2003 was 90 km² with a core of 11.7 km², as estimated by the kernel home range method. Timber rattlesnakes have variable sizes in home ranges, between 16-207 ha (Brown 1993a, Brown 1993b).

The minimum 10 ha for suitable habitat was chosen because many of the bird species of a special or regional concern are forest-interior birds, that is birds that nest within the interior core of a forest patch (area of forest > 90 m from an edge) (Faaborg et al. 1995,). The minimum core required to provide suitable breeding habitat for area-sensitive species are 10 ha of forest core (Franklin 1993, Faaborg et al. 1995, Dawson et al. 1993, Collinge 1996, Dawson et al, 1998, Hamel 2000). Area-sensitive birds tend not to occur in forests that lack core habitat (McCollin 1998).

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Land Use Land Cover Selections and Patch Type Justifications

18 Hectare Grassland

BIOPID 1004 **REGION** Statewide

PATCH TYPE Contiguous Area

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	<i>1-10</i>
2100	CROPLAND AND PASTURELAND	Dissolved	<i>1-10</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Dissolved	<i>1-10</i>
2300	CONFINED FEEDING OPERATIONS	Dissolved	<i>1-10</i>
2400	OTHER AGRICULTURE	Dissolved	<i>1-10</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Dissolved	<i>1-10</i>

Land Use - Land Cover Selection and Patch Type Rationale

Endangered and rare species tend to have specific habitat requirements for foraging, nesting and cover (i.e. habitat "specialists"), making them more vulnerable to changes in the landscape. As it is, loss of habitat is the primary cause of the decline in species, affecting 85% of the species of plants, mammals, birds, herptiles, fish, and invertebrates, followed by the increase of non-native species (Wilcove et al. 1998). When their habitats are lost or degraded because of fragmentation, individuals of the species are also lost because they cannot utilize habitats other than that which they are specialized for (With and Crist 1995, Collinge 1996).

The minimum core required to provide suitable breeding habitat for area-sensitive grassland species is 18 Ha. of grassland core (Franklin 1993, Faaborg et al. 1995, Vickery et al. 1994, Collinge 1996, Mitchell et al. 2000, Dechant et al. 2002, Smallwood and Bird 2002). Area-sensitive birds tend not to occur in grasslands that lack core habitat (Forman et al. 2002)).

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Land Use Land Cover Selections and Patch Type Justifications

Beach *BIOPID* 1001 *REGION* Statewide *PATCH TYPE* Limited Extent

<i>LU20</i>	<i>LABEL 20</i>	<i>LULC TREATMENT</i>	<i>CITATIONS</i>
7100	BEACHES	Undissolved	<i>1-6</i>

Land Use - Land Cover Selection and Patch Type Rationale

These landscapes are the dynamic interface between the marine and the terrestrial environment and support an abundance of fauna, both seasonally and throughout the year. Beaches are crucial staging grounds for migratory shorebirds (Botton et al. 1994; Burger et al. 1997). It is on sandy beaches, particularly in the Delaware Bay region where horseshoe crabs spawn, leaving behind legions of high energy eggs unparalleled for satiating migrating birds. Abundance and availability of this food source is paramount for successful migration of threatened and endangered shorebirds in the Western hemisphere (Botton et al. 1994). Red knots, semipalmated sandpipers, sanderlings, and ruddy turnstones make up a majority of foraging migratory shorebirds on beaches in the Delaware Bay region (Botton, et al. 1994). Due to the tumultuous nature of tidal areas, a mosaic of habitat types are crucial to providing a stable and predictable food source for foraging birds. One study indicated that shorebirds forage on sandy beach up to 34% of the time (Burger et al. 1997), indicating the importance of sandy beaches for providing habitat heterogeneity. Piping Plovers choose beaches for foraging based in part on the presence of people and feed more continuously when there are few people in close proximity (Burger 1994).

Beach nesting birds such as common terns, least terns and piping plovers are in decline due to a reduction in optimal (undisturbed) beach nesting sites- resulting in fewer successful breedings (Burger 1987, Erwin and Smith 1985). Sandy inlets are preferred by piping plovers to oceanfront beaches due to greater expanses of suitable nesting and foraging areas (Davis 2008).

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Land Use Land Cover Selections and Patch Type Justifications

Coastal Forest

BIOPID 1006 REGION Atlantic Coastal PATCH TYPE Contiguous Area

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-9
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-9
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1-9
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-9
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1-9
4230	PLANTATION	Dissolved	1-9
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-9
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1-9
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-9
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1-9
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-9
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-9
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-9
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-9
6210	DECIDUOUS WOODED WETLANDS	Dissolved	1-9

6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-9</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1-9</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-9</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-9</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-9</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-9</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-9</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-9</i>

Land Use - Land Cover Selection and Patch Type Rationale

Coastal forests are essential stopover habitat for neotropical migrating songbirds (Rodewald and Brittingham 2004; Somershoe and Chandler 2004). While forest breeding birds utilize and prefer forests of particular successional stages, species composition, and core area during the breeding season, migratory songbirds appear to lose fidelity to these specifics during fall migration. Both shrubland and forest interior birds are found in a range of forest types including early successional and mature forest edge (Rodewald and Brittingham 2004). The pinelands are a largely contiguous area of early to mid- successional forest (due to fire) and valuable stopover habitat to songbirds as they migrate through the state (Kirchman et al. 2011). It is due to this broad use of coastal forest by migrating birds that the habitat is broadly valued for the landscape project.

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Land Use Land Cover Selections and Patch Type Justifications

Lower 20K Forest

BIOPID 1007 REGION Atlantic Coastal PATCH TYPE Contiguous Area
& Delaware Bay

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Dissolved	1-3
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-3
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Dissolved	1-3
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Dissolved	1-3
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Dissolved	1-3
4230	PLANTATION	Dissolved	1-3
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Dissolved	1-3
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Dissolved	1-3
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Dissolved	1-3
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Dissolved	1-3
4420	DECIDUOUS BRUSH/SHRUBLAND	Dissolved	1-3
4430	CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-3
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Dissolved	1-3
4500	SEVERE BURNED UPLAND VEGETATION	Dissolved	1-3

6210	DECIDUOUS WOODED WETLANDS	Dissolved	<i>1-3</i>
6220	CONIFEROUS WOODED WETLANDS	Dissolved	<i>1-3</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Dissolved	<i>1-3</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-3</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Dissolved	<i>1-3</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-3</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-3</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Dissolved	<i>1-3</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Dissolved	<i>1-3</i>

Land Use - Land Cover Selection and Patch Type Rationale

The forest habitat in the lower 20 kilometers on the Cape May peninsula is a critical area in New Jersey that serves as a migratory raptor concentration site as well as a wintering area for some species. Documented species include: American kestrels, Broad-winged hawks, Cooper's hawks, Osprey, Sharp-shinned hawks, and Bald eagles, among others (Niles et al. 1996, Sutton and Kerlinger 1997, Frank 2007). It is hypothesized that some of these raptors utilize this habitat much like migratory shorebirds, to rest and refuel. According to Niles et al (1996), specific habitat preferences for resting within the lower 20K forest closely mirrored habitat preferences during breeding or wintering by the majority of species highlighted. Additionally, when flying over the Cape May Point area, species again demonstrated preference of habitat typically used to forage by flying lowest and in the higher densities above such areas (Niles et al. 1996). As Cape May and surrounding areas continue to develop, these raptors find less suitable wintering/staging grounds and are forced to search out other areas in an effort to survive. Individuals spend more time foraging and/or forced prematurely to cross the Delaware Bay as a result (Sutton and Kerlinger 1997, Frank 2007). The decline in migratory raptor numbers in recent years coupled with increasing aggregations in areas north of the lower 20K, may point to implications that less suitable habitat for survival is being used (Frank 2007).

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Land Use Land Cover Selections and Patch Type Justifications

Riparian Corridor

BIOPID 1008 REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1110	RESIDENTIAL, HIGH DENSITY, MULTIPLE DWELLING	Undissolved	1-6
1120	RESIDENTIAL, SINGLE UNIT, MEDIUM DENSITY	Undissolved	1-6
1130	RESIDENTIAL, SINGLE UNIT, LOW DENSITY	Undissolved	1-6
1140	RESIDENTIAL, RURAL, SINGLE UNIT	Undissolved	1-6
1150	MIXED RESIDENTIAL	Undissolved	1-6
1200	COMMERCIAL/SERVICES	Undissolved	1-6
1211	MILITARY RESERVATIONS	Undissolved	1-6
1214	NO LONGER MILITARY, USE TO BE DETERMINED	Undissolved	1-6
1300	INDUSTRIAL	Undissolved	1-6
1400	TRANSPORTATION/COMMUNICATIONS/UTILITIES	Undissolved	1-6
1410	MAJOR ROADWAY	Undissolved	1-6
1411	MIXED TRANSPORTATION CORRIDOR OVERFLAP AREA	Undissolved	1-6
1419	BRIDGE OVER WATER	Undissolved	1-6
1420	RAILROADS	Undissolved	1-6
1440	AIRPORT FACILITIES	Undissolved	1-6

1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	<i>1-6</i>
1462	UPLAND RIGHTS-OF-WAY (DEVELOPED)	Undissolved	<i>1-6</i>
1463	UPLAND RIGHTS-OF-WAY (UNDEVELOPED)	Undissolved	<i>1-6</i>
1499	STORMWATER BASIN	Undissolved	<i>1-6</i>
1500	INDUSTRIAL/COMMERCIAL COMPLEXES	Undissolved	<i>1-6</i>
1600	MIXED URBAN OR BUILT-UP LAND	Undissolved	<i>1-6</i>
1700	OTHER URBAN OR BUILT-UP LAND	Undissolved	<i>1-6</i>
1710	CEMETERY	Undissolved	<i>1-6</i>
1711	CEMETERY ON WETLAND	Undissolved	<i>1-6</i>
1741	PHRAGMITES DOMINATE URBAN AREAS	Undissolved	<i>1-6</i>
1750	MANAGED WETLAND IN MAINTAINED LAWN GREENSPACE	Undissolved	<i>1-6</i>
1800	RECREATIONAL LAND	Undissolved	<i>1-6</i>
1804	ATHLETIC FIELDS (SCHOOLS)	Undissolved	<i>1-6</i>
1810	STADIUM THEATERS CULTURAL CENTERS AND ZOOS	Undissolved	<i>1-6</i>
1850	MANAGED WETLAND IN BUILT-UP MAINTAINED REC AREA	Undissolved	<i>1-6</i>
2100	CROPLAND AND PASTURELAND	Undissolved	<i>1-6</i>
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	<i>1-6</i>
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	<i>1-6</i>
2200	ORCHARDS/VINEYARDS/NURSERIES/HORTICULTURAL AREAS	Undissolved	<i>1-6</i>

2300	CONFINED FEEDING OPERATIONS	Undissolved	<i>1-6</i>
2400	OTHER AGRICULTURE	Undissolved	<i>1-6</i>
4110	DECIDUOUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6</i>
4120	DECIDUOUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6</i>
4210	CONIFEROUS FOREST (10-50% CROWN CLOSURE)	Undissolved	<i>1-6</i>
4220	CONIFEROUS FOREST (>50% CROWN CLOSURE)	Undissolved	<i>1-6</i>
4230	PLANTATION	Undissolved	<i>1-6</i>
4311	MIXED FOREST (>50% CONIFEROUS WITH 10%-50% CROWN CLOSURE)	Undissolved	<i>1-6</i>
4312	MIXED FOREST (>50% CONIFEROUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6</i>
4321	MIXED FOREST (>50% DECIDUOUS WITH 10-50% CROWN CLOSURE)	Undissolved	<i>1-6</i>
4322	MIXED FOREST (>50% DECIDUOUS WITH >50% CROWN CLOSURE)	Undissolved	<i>1-6</i>
4410	OLD FIELD (< 25% BRUSH COVERED)	Undissolved	<i>1-6</i>
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	<i>1-6</i>
4420	DECIDUOUS BRUSH/SHRUBLAND	Undissolved	<i>1-6</i>
4430	CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6</i>
4440	MIXED DECIDUOUS/CONIFEROUS BRUSH/SHRUBLAND	Undissolved	<i>1-6</i>
4500	SEVERE BURNED UPLAND VEGETATION	Undissolved	<i>1-6</i>
5100	STREAMS AND CANALS	Undissolved	<i>1-6</i>
5190	EXPOSED FLATS	Undissolved	<i>1-6</i>

5200	NATURAL LAKES	Undissolved	<i>1-6</i>
5300	ARTIFICIAL LAKES	Undissolved	<i>1-6</i>
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	<i>1-6</i>
5411	OPEN TIDAL BAYS	Undissolved	<i>1-6</i>
5412	TIDAL MUD FLAT	Undissolved	<i>1-6</i>
5420	DREDGED LAGOON	Undissolved	<i>1-6</i>
5430	ATLANTIC OCEAN	Undissolved	<i>1-6</i>
6111	SALINE MARSHES (LOW MARSH)	Undissolved	<i>1-6</i>
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	<i>1-6</i>
6120	FRESHWATER TIDAL MARSHES	Undissolved	<i>1-6</i>
6130	VEGETATED DUNE COMMUNITIES	Undissolved	<i>1-6</i>
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	<i>1-6</i>
6210	DECIDUOUS WOODED WETLANDS	Undissolved	<i>1-6</i>
6220	CONIFEROUS WOODED WETLANDS	Undissolved	<i>1-6</i>
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	<i>1-6</i>
6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-6</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6</i>

6240	HERBACEOUS WETLANDS	Undissolved	<i>1-6</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-6</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-6</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-6</i>
6290	UNVEGETATED FLATS	Undissolved	<i>1-6</i>
6500	SEVERE BURNED WETLANDS	Undissolved	<i>1-6</i>
7100	BEACHES	Undissolved	<i>1-6</i>
7200	BARE EXPOSED ROCK, ROCK SLIDES, ETC.	Undissolved	<i>1-6</i>
7300	EXTRACTIVE MINING	Undissolved	<i>1-6</i>
7400	ALTERED LANDS	Undissolved	<i>1-6</i>
7430	DISTURBED WETLANDS (MODIFIED)	Undissolved	<i>1-6</i>
7440	DISTURBED TIDAL WETLANDS	Undissolved	<i>1-6</i>
7500	TRANSITIONAL AREAS	Undissolved	<i>1-6</i>
7600	UNDIFFERENTIATED BARREN LANDS	Undissolved	<i>1-6</i>

Land Use - Land Cover Selection and Patch Type Rationale

Corridors are landscape features that may facilitate travel and gene flow by connecting fragmented patches of habitat. Riparian corridors are important for both aquatic and terrestrial species as they form the transitional area between the two systems and may provide foraging and nesting opportunities less available in interior/upland forest (Inman et al. 2002, Smith et al. 2008).

Riparian corridor use by Indiana bats is documented and presumed to facilitate favorable travel between roosting and foraging sites. Researchers believe that these areas are conducive for more efficient flight (less structural complexity) while providing orientation information and higher insect abundance due to a linear shape (Menzel et al. 2005).

A breeding bird study in Michigan indicated northern parula, blackburnian, Canada and Nashville warblers and blue-headed vireo were far more abundant in riparian-forested areas versus upland forests. Veery and black-throated green warblers were also detected in high numbers in riparian forest (Bub et al. 2004). A study in Pennsylvania found that disturbed riparian corridors (agricultural and residential) contained only migrating neotropical birds whereas undisturbed corridors (>25 m of natural vegetation) were essential to supporting sensitive species (Croonquist and Brooks 1993). Species richness and evenness were higher in surveys of breeding birds in riparian versus upland forest (Inman et al. 2002, Bub et al. 2004) and negatively correlated with distance from streams in disturbed watersheds (Croonquist and Brooks 1993).

Wood Turtles spend the majority of the year in or adjacent to permanent streams and typically within forest edge habitat. In New Jersey during summer months, adult wood turtles are known for extensive travel over terrestrial areas though juveniles and hatchlings remain close to water (NatureServe 2011).

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Land Use Land Cover Selections and Patch Type Justifications

Water

BIOPID 1002 REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
5100	STREAMS AND CANALS	Undissolved	1-4
5200	NATURAL LAKES	Undissolved	1,3,4
5300	ARTIFICIAL LAKES	Undissolved	1,3,4
5410	TIDAL RIVERS, INLAND BAYS, AND OTHER TIDAL WATERS	Undissolved	1-4
5411	OPEN TIDAL BAYS	Undissolved	1-4
5430	ATLANTIC OCEAN	Undissolved	1-4

Land Use - Land Cover Selection and Patch Type Rationale

Water is essential for all species in some capacity. Beyond the obvious need for conservation of water resources in aquatic and marine dwelling species, is the partial need by organisms during some period of their life history. Sea turtles and cetaceans require marine waters for the very substrate they live in. Atlantic sturgeon use a spectrum of aquatic habitats from fresh to marine for varying stages of their life cycles; spawning in rivers with juveniles gradually moving towards estuaries and eventually marine environments as they age. (Hatin et al 2007). Bald eagles, osprey and pied-billed grebes require open water for foraging (Buehler 2000, Sibley 2003). Odonates are aquatic insects requiring freshwater such as streams and lakes for egg laying, growth and development, spending the majority of their lives underwater-emerging only as adults (NatureServe 2011). Habitat suitability for many terrestrial species is in part determined by varying proximity to water resources.

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Land Use Land Cover Selections and Patch Type Justifications

Wetlands

BIOPID 1003 REGION Statewide

PATCH TYPE Limited Extent

LU20	LABEL 20	LULC TREATMENT	CITATIONS
1461	WETLAND RIGHTS-OF-WAY (MODIFIED)	Undissolved	1-13
1741	PHRAGMITES DOMINATE URBAN AREAS	Undissolved	1-13
2140	AGRICULTURAL WETLANDS (MODIFIED)	Undissolved	1-13
2150	FORMER AGRICULTURAL WETLAND (BECOMING SHRUBBY, NOT BUILT-UP)	Undissolved	1-13
4411	PHRAGMITES DOMINATE OLD FIELD	Undissolved	1-13
5190	EXPOSED FLATS	Undissolved	1-13
5412	TIDAL MUD FLAT	Undissolved	1-13
6111	SALINE MARSHES (LOW MARSH)	Undissolved	1-13
6112	SALINE MARSHES (HIGH MARSH)	Undissolved	1-13
6120	FRESHWATER TIDAL MARSHES	Undissolved	1-13
6130	VEGETATED DUNE COMMUNITIES	Undissolved	1-13
6141	PHRAGMITES DOMINATE COASTAL WETLANDS	Undissolved	1-13
6210	DECIDUOUS WOODED WETLANDS	Undissolved	1-13
6220	CONIFEROUS WOODED WETLANDS	Undissolved	1-13
6221	ATLANTIC WHITE CEDAR SWAMP	Undissolved	1-13

6231	DECIDUOUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13</i>
6232	CONIFEROUS SCRUB/SHRUB WETLANDS	Undissolved	<i>1-13</i>
6233	MIXED SCRUB/SHRUB WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13</i>
6234	MIXED SCRUB/SHRUB WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13</i>
6240	HERBACEOUS WETLANDS	Undissolved	<i>1-13</i>
6241	PHRAGMITES DOMINATE INTERIOR WETLANDS	Undissolved	<i>1-13</i>
6251	MIXED FORESTED WETLANDS (DECIDUOUS DOM.)	Undissolved	<i>1-13</i>
6252	MIXED FORESTED WETLANDS (CONIFEROUS DOM.)	Undissolved	<i>1-13</i>
6290	UNVEGETATED FLATS	Undissolved	<i>1-13</i>
6500	SEVERE BURNED WETLANDS	Undissolved	<i>1-13</i>

Land Use - Land Cover Selection and Patch Type Rationale

Emergent wetland types play a critical role in any ecosystem. Aside from the beneficial functions they provide for people, this unique habitat type is crucial to the existence of several wetland dependent species. Sizes ranging from less than 1 acre to several acres are of equal importance because of their role as habitat for wetland dependent species that vary in their mobility. Species like the American bittern and black rails occupy habitat up to 4 hectares while salamanders, such as the blue spotted salamander can occupy small isolated wetlands and frequently do not travel more than 300 meters from their breeding sites (Eddleman et al. 1994, Gibbs et al. 1992, Semlitsch and Bodie 2003).

For species that are habitat specialists and/or with limited dispersal capabilities, the presence of corridors can provide an effective means to enhance dispersal, thus reducing the effects of isolation and fragmentation on a population (Chase et al. 1989, Collinge 1996, Beier and Noss 1998 Simberloff and Cox 1987, Haddad 1999). Bog turtles almost exclusively inhabit emergent wetland types and value wetland connectivity to support gene flow and travel corridor as individual sites degrade or improve in condition in time. A several hundred-acre wetland can sustain multiple viable colonies and occurrences of the species that value them (Chase et al. 1989).

Forested wetlands are core habitat types for ambystomid breeding salamanders and core and travel corridor for wood turtle.

Some forest song birds, such as Canada warblers use a wide range of deciduous, coniferous and mixed wetland forests with a well-developed understory (Conway 1999). They inhabit lowland and upland habitats, including swamps, streamside thickets, brushy ravines, moist forests, and regenerating timber cuts with well-developed scrubs layers and structurally complex forest floor. They are area sensitive in "settled" areas but not in forest-dominated regions (Lambert and Faccio 2005). Barred owls inhabit forested wetland areas and have been used as an "umbrella" species for modeling of this habitat type (Rubino et al. 2003).

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