Appendix II. Species Occurrence Area Justifications.

The Species Occurrence Area (SOA) Justifications describe how SOAs are generated for each source feature species-feature label combination extracted from the Biotics database. The justifications also provide a review of the peer-reviewed scientific literature and/or information obtained through NJDEP Fish and Wildlife (NJFW) research that was used to support the occurrence area polygon size. The SOA justifications are sorted alphabetically by class. Use the bookmarks in this document to navigate to particular species-feature label combinations.

Terms used in the SOA justifications are defined below.

SpcFLID - A unique ID for each species/feature label combination.

LUC - Location Use Class. A label used for aerial and marine migrants that occupy disjunct locations by season (i.e. breeding or nonbreeding). Applies to migratory species only.

Feature Label - A label assigned to each occurrence that describes the occurrence type (i.e. nest, den, dead on road, etc.).

Buffer Size - The radius applied to the point, line, or polygon source feature extracted from the Biotics database to generate the Species Occurrence Area (SOA).

Species Occurrence Area (SOA) - A polygon specific to each species-feature label combination that is applied to all occurrences in the Biotics database and that is used to value habitat in the Landscape Project. The area of the polygon is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through NJFW research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in New Jersey. For many species that value habitat patches in the Landscape Project maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In these cases, a default occurrence area (71.25m radius) is applied to take into account locational uncertainty.

Point Rule - The action applied to source feature points extracted from Biotics to generate the SOA.

Line Rule - The action applied to source feature lines extracted from Biotics to generate the SOA.

Poly Rule - The action applied to source feature polygons extracted from Biotics to generate the SOA.

LP - Yes/No as to whether source features with a given species/feature label combination are to be incorporated in the Landscape Project mapping.

Actinopterygii

Atlantic Sturgeon
Acipenser oxyrinchus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6433	Freshwater	Nursery Area - Young-of-year Sighting	5 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
6434	Freshwater	Migration Corridor - Adult Sighting	30 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
6435	Freshwater	Summering Area - Adult Sighting	30 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
6436	Freshwater	Spawning Area - Adult Sighting	30 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
6437	Freshwater	Migration Corridor - Juvenile Sighting	10 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
6438	Freshwater	Nursery Area - Larvae Sighting	5 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
6440	Freshwater	Spawning Area - Egg Sighting	71.25 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
6441	Freshwater	Summering Area - Juvenile Sighting	10 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
8916	Freshwater	Occupied Habitat - Adult Sighting	Need Update				Yes

Justification:

Little is known about the movement patterns of Atlantic sturgeon in the Delaware River estuary and along the coast. The Atlantic sturgeon is an anadromous fish species, migrating from open ocean to fresh or brackish water to spawn. Young may spend up to four years in their natal river before migrating to sea. Recent sonic tagging studies suggest that a reproducing population still exists in the Delaware River, with spawning occurring much farther upriver than during the height of late 1800's fishery. Though an exact spawning area has not been determined, at least one Atlantic sturgeon was tracked migrating in the Bordentown area during the spawning season. Following presumed spawning, tracking data indicate that the lower, poly-mesohaline portions of Delaware Bay serve as habitat for adults. In addition, the lower Delaware River is thought to serve as an important summer feeding ground for immature sturgeon.

Coastal movement of Atlantic sturgeon remains unclear. According to Fox et al. (2009), the higher salinity regions at the mouth of the Delaware Estuary serve as critical habitat for Atlantic sturgeon from multiple river systems. Despite mixing in coastal waters, tagging records indicate that Atlantic sturgeon return to their natal rivers to spawn. Sturgeon tagged in the lower Delaware River have been recaptured in coastal waters form North Carolina to Maine. Since data are limited, the SOA for coastal/ocean adults is an extremely conservative estimate of habitat usage and how far Atlantic sturgeon are capable of migrating. For example, ocean migrations of up to 1,450 kilometers have been recorded, though it would impractical to apply such as distance here. Since the Atlantic sturgeon is a newly listed species (Federal and State Endangered as of April 6, 2012), and information in Biotics is lacking, SOA's will be refined as location and movement data are acquired. The SOA distances for early life stages and juvenile/adult movement within the river system are based upon SOA distances chosen for shortnose sturgeon.

Literature:

Atlantic Sturgeon Status Review Team. 2007. Status Review of Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus). Report to National Marine Fisheries Service, Northeast Regional Office. February 23, 2007.

Delaware River movement, spawning area.

Bain, M.B. 1997. Atlantic and shortnose sturgeons in the Hudson River: common and divergent life history attributes. Environmental Biology of Fishes 48:347-358.

N/A

Delaware Division of Fish and Wildlife. 2009. Delaware River Atlantic Sturgeon Research Fact Sheet, DNREC website.

N/A

Dovel and Berggren 1983. Atlantic sturgeon of the Hudson estuary, New York, New York. Fish and Game Journal 30:140-172.

Migration distance.

Fisher, M.T., Jacobini, J. and C.A. Shirey. A telemetry study of late stage juvenile Atlantic sturgeon, Acipenser oxyrinchus: seasonal movements and habitat use in the Delaware estuary in 2007 and 2008 with comparisons to a similar telemetry study in 1997 and 1998 (Abstract only). Presented at 1st Symposium on Atlantic Sturgeon, Seaboard Fisheries Institute, Feb. 23-25, 2009, Newark, DE.

General movement.

Fox, D., Brown. L.B., and P.C. Simpson. Life after the party: Atlantic sturgeon in the Delaware River (Abstract only). Presented at 1st Symposium on Atlantic Sturgeon, Seaboard Fisheries Institute, Feb. 23-25, 2009, Newark, DE.

General movement.

Gilbert, C.R. 1989. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (mid-Atlantic bight) - Atlantic and shortnose sturgeons. U.S. Fish Wildl. Serv. Biol. Rep. 82(11.122). U.S. Army Corps of Engineers TR EL-82-4. 28 pp.

Eggs demersal adhesive, nothing known about larvae.

Last researched by: Bowers-Altman

Date researched: 6/11/2012

Actinopterygii

Blackbanded Sunfish

Enneacanthus chaetodon

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8917	Not applicable	Occupied Habitat	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8568	Not applicable	Capture Location - Adult	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8569	Not applicable	Capture Location - Egg	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8570	Not applicable	Capture Location - Larvae	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8571	Not applicable	Capture Location -YOY	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

Justification:

The blackbanded sunfish is a small centrarchid reaching a maximum total length of 4 inches (Freeman et al. 1999) with a distinct series of six vertical black bars and sides with yellow flecks, it makes for an attractive aquarium fish. They're found in slow-moving streams and ponds with low turbidity and plenty of vegetation. In New Jersey, their range is restricted primarily to the acidic waters of the Pinelands and are rare outside where a combination of factors, such as landuse changes, non-native species, and degraded water quality has contributed to their loss. Movement or dispersal behavior of blackbanded sunfish has not been well documented or studied extensively. However, sunfish tend to have restricted movement. In a movement study conducted by Smithson and Johnston (1999) in a lotic environment they found that 70% of the recaptured sunfish species moved less than 100 m and the most distant recapture was 506 m. Irmscher and Vaughn (2015) found that sunfish moved more in an upstream direction but generally remained in the area of initial capture (not greater than 50 m). Paukert et al. (2004) found that Bluegill Sunfish in a larger lake (332 hectares) may exhibit movements related to season and can have home ranges ranging from 0.13 to 172 ha. Although Paukert et al. (2004) documented some of the largest movements of sunfish in the literature, the smallest bluegill tracked in the study was 211 mm (a rather large sunfish), and other studies indicate movement and home range is influenced by sunfish size (Minns 1995). Hammerson (2001) suggests that a single separation distance for centrarchids should be used (10 km) because dispersal and movement varies between different sized members of the sunfishes group. Considering the general small size of the blackbanded sunfish a 1 km radius buffer is chosen. Our recommendations do not consider distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Freeman, B.J., Owers, K., Albanese, B., and Abouhamdan, Z. (1999). "Notropis scepticus Species Profile (Updated 2016).' Georgia Department of Natural Resources, Social Circle,

Georgia.

Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for Sunfishes (Centrarchids).

Irmscher, P. & C.C. Vaughn. 2015. Limited movement of freshwater mussel fish hosts in a southern US river. Hydrobiologia 757:223-233.

Minns, C.K. 1995. Allometry of home range size in lake and river fishes. Canadian Journal of Fisheries and Aquatic Sciences 52:1499-1508.

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.

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.

Last researched by: Collenburg

Date researched: 9/12/2023

Actinopterygii

Bridle Shiner

Notropis bifrenatus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8919	Not applicable	Occupied Habitat	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8572	Not applicable	Capture Location - Adult	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8573	Not applicable	Capture Location - Egg	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8574	Not applicable	Capture Location - Larvae	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8575	Not applicable	Capture Location -YOY	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

Justification:

The bridle shiner is one of the smallest members of the minnow family (Cyprinidae) rarely exceeding 2 inches in total length (Harrington 1947). They prefer clear, slow-moving waters with submerged vegetation (Horwitz 1985) and were once widely distributed across the state. So common that they were once used as bait. Abbott (1874) described their distribution as "exceedingly abundant and supplies the carnivorous fishes with an unfailing supply of food." However, they've declined significantly across their range due to factors such as increased turbidity, changes in land use, pollution, and possibly the introduction of predators (Holm et al. in press, Geneva et al. 2018). Hammerson (2004) reports on the NatureServe web site that separation distances for cyprinids are arbitrary because data on dispersal and other movements generally are not available but separation distance generally increases with fish size. A movement study conducted by Jensen (2012) found bridle shiner in the study area moved infrequently (94.5% of individuals did not move from the initial patch they were captured in), and the maximum distance of emigration was 240m. This is consistent with notes from Hammerson (2004). Considering the small size and weak swimming ability of the bridle shiner a 1 km radius buffer is conservative. Our recommendations do not consider distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Abbott, C.C. 1874. Notes on the Cyprinoids of central of New Jersey. The American Naturalist. Vol. 8, No. 6. 326-338.

Geneva, A.J., A.M. Kreit, S. Neiffer, S. Tsang, and R.J. Horwitz. 2018. Regional population structure of the endangered Bridle Shiner (Notropis bifrenatus). 2018. Conservation Genetics 19:1039:1053.

Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for small cyprinids

Harrington, R.W., Jr. 1948. The life cycle and fertility of the Bridled Shiner, Notropis bifrenatus (Cope). The American Midland Naturalist. 39(1): 83-92.

Holm, E., P. Dumont, J. Leclerc, G. Roy and E.J. Crossman. In Press. COSEWIC status report on the bridle shiner Notropis bifrenatus in Canada, in COSEWIC assessment and status report on the bridle shiner Notropis bifrenatus in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-19 pp.

Horwitz R.J. 1985. Status of the bridle shiner, Notropis bifrenatus in Pennsylvania. Species of Special Concern Special Publication Carnegie Museum Natural History 11:190-193

Jensen, T. 2012. Movement, Habitat Use and Detection Probability of Bridle Shiner Estimated by Patch Occupancy Modeling in a Connecticut Watershed. Master's Theses. 336.

Last researched by: Collenburg

Date researched: 9/12/2023

Actinopterygii

Comely Shiner
Notropis amoenus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8921	Not applicable	Occupied Habitat	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8556	Not applicable	Capture Location - Adult	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8557	Not applicable	Capture Location - Egg	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8558	Not applicable	Capture Location - Larvae	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8559	Not applicable	Capture Location -YOY	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

Justification:

The comely shiner is a slender minnow, reaching 3.5 inches in length (Fowler 1905) and found in the Delaware and Raritan River drainages in New Jersey. 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). This may infer a stronger swimming ability than other smaller species within the Notropis genus. However, comely shiner populations are disjunct and movement, especially with respect to dispersal, is not well understood. This is consistent with Hammerson's (2004) observation that data on dispersal and movement of cyprinids are generally not available. Given that separation distance is arbitrary and not well understood, a 1 km radius buffer is chosen. Our recommendations do not consider distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Cooper, E.L. 1983. Fishes of Pennsylvania. Pennsylvania State University Press, University Park, PA.

Fowler, H.W. 1905. Fishes of New Jersey. Annual Report of the New Jersey State Museum, Trenton, NJ.

Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for small cyprinids.

Last researched by:	Collenburg
Date researched:	9/12/2023

Actinopterygii

Ironcolor Shiner

Notropis chalybaeus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5770	Not applicable	Capture Location - Larvae	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
5771	Not applicable	Capture Location - Adult	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
5772	Not applicable	Capture Location - Egg	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
5773	Not applicable	Capture Location - YOY	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8922	Not applicable	Occupied Habitat	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

Justification:

The ironcolor shiner is a slender minnow that can reach 2.5 inches in length and prefers clear, heavily vegetated water, sand-bottomed pools, and slow-moving streams. They have declined throughout its range along the Atlantic coast and is possibly the most-rare native freshwater fish in New Jersey, currently existing in only five known waters. Population declines of ironcolor shiner have been noted across their historical range (Hanson 2013) and habitat alteration, pollution, and increased turbidity have all been implicated as causes (Leckvarcik 2001). Movements of the ironcolor shiner is quite limited but generally related to changes in the bottom contours, water level, and sources of available food (Marshall 1947). They will form aggregations but are not compact and movements of individuals is independent. Meaning, they often move freely between aggregations (Marshall 1947). In NJ, as well as in other locations on the periphery of its range, ironcolor shiner populations are disjunct and movement, especially with respect to dispersal, is not well understood. This is consistent with Hammerson's (2004) observation that data on dispersal and movement of cyprinids are generally not available. Given that separation distance is arbitrary and not well understood, a 1 km radius buffer is chosen. Our recommendations do not consider distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources

Literature:

Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for small cyprinids.

Hanson, C.W. 2012. Aquatic Habitat Characters That Support Both the Bridle Shiner (Notropis bifrenatus) and the Ironcolor Shiner (Notropis chalybaeus). Master of Science thesis. The Pennsylvania State University, University Park, Pennsylvania.

Leckvarcik, L. G. 2001. Life History of the Ironcolor Shiner, Notropis chalybaeus (Cope), in Marshalls Creek, Monroe County, Pennsylvania. Master of Science thesis. The Pennsylvania State University, University Park, Pennsylvania.

Marshall, N. 1947. Studies of the life history and ecology of Notropis chalybaeus (Cope). Q.J. Fla. Acad. Sci., 9:163-188.

Last researched by: Collenburg

Date researched: 9/12/2023

Actinopterygii

Mud Sunfish

Acantharchus pomotis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8923	Not applicable	Occupied Habitat	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8576	Not applicable	Capture Location - Adult	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8577	Not applicable	Capture Location - Egg	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8578	Not applicable	Capture Location - Larvae	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8579	Not applicable	Capture Location -YOY	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

Justification:

The mud sunfish is a small centrarchid, although there are reports of individuals reaching a maximum total length of 218 mm (Rohde et al. 1999). They're dark brown or green with 5 to 8 indistinct, dark lateral bands (Raasch 1997) and 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. Movement or dispersal behavior of mud sunfish has not been well documented or studied extensively. However, sunfish tend to have restricted movement. In a movement study conducted by Smithson and Johnston (1999) in a lotic environment they found that 70% of the recaptured sunfish species moved less than 100 m and the most distant recapture was 506 m. Irmscher and Vaughn (2015) found that sunfish moved more in an upstream direction but generally remained in the area of initial capture (not greater than 50 m). Paukert et al. (2004) found that Bluegill Sunfish in a larger lake (332 hectares) may exhibit movements related to season and can have home ranges ranging from 0.13 to 172 ha. Although Paukert et al. (2004) documented some of the largest movements of sunfish in the literature, the smallest bluegill tracked in the study was 211 mm (a rather large sunfish), and other studies indicate movement and home range is influenced by sunfish size (Minns 1995). Hammerson (2001) suggests that a single separation distance for centrarchids should be used (10 km) because dispersal and movement varies between different sized members of the sunfishes group. Considering the general small size of the mud sunfish a 1 km radius buffer is conservative. Our recommendations do not consider distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Cooper, E. L. 1983. Fishes of Pennsylvania and the northeastern United States. Pennsylvania State University Press, University Park. 243 pp.

Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for Sunfishes (Centrarchids).

Irmscher, P. & C.C. Vaughn. 2015. Limited movement of freshwater mussel fish hosts in a southern US river. Hydrobiologia 757:223-233

Minns, C.K. 1995. Allometry of home range size in lake and river fishes. Canadian Journal of Fisheries and Aquatic Sciences 52:1499-1508.

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.

Raasch, M. 1997. Delaware's Freshwater and Brackish-Water Fishes - A popular account. 3rd edition.

Rohde, F.C., R.G. Arndt, J.W. Foltz, and J.M. Quattro. 2009. Freshwater Fishes of South Carolina. The University of South Carolina Press, Columbia, SC. 430 pp.

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.

Last researched by: Collenburg

Date researched: 9/25/2023

Actinopterygii

Northern Hog Sucker
Hypentelium nigricans

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8924	Not applicable	Occupied Habitat	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8514	Not applicable	Capture Location - Adult	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8515	Not applicable	Capture Location - Egg	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8516	Not applicable	Capture Location - Larvae	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8517	Not applicable	Capture Location -YOY	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

Justification:

The northern hog suckers can grow up to 22 inches and prefer clean, cool-water streams 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. Northern Hog Suckers can have a small home range where they limit their travel to a few hundred feet (Steiner 2011) but are strong swimmers that can exhibit daily movements up to 425 m as documented by Matheney and Rabeni (1995). When habitat is fragmented their daily movements in a day can be as large as 0.8 km (Williams 2019). Hammerson (2004) recommends a separation distance of 15 km as data on dispersal for catostomids is generally unavailable but increases with fish size. Considering separation distances are arbitrary and defining suitable and unsuitable habitat is difficult, a 1 km radius SOA was chosen. Our recommendations do not consider distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Carlson, D.M. and J.E. Carlson. 2022. Fishes of Northern New York and the Adirondacks. Northeastern Naturalist, 29(Monograph 21):1-46.

Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for medium suckers.

Matheney, M.P. and C.F. Rabeni. 1995. Patterns of movement and habitat use by Northern Hog Suckers in an Ozark stream. Transactions of the American Fisheries Society. 124(6):886-

897.

Steiner, L. 2011. Pennsylvania Fishes. Pennsylvania Fish and Boat Commission. 170 pp.

Williams, J.M. 2019. A low-water crossing impacts Northern Hog Sucker Hypentelium nigricans movement in an Ozark stream. Master of Science thesis. Missouri State University.

Last researched by: Collenburg

Date researched: 9/26/2023

Actinopterygii

Shield Darter

Percina peltata

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8925	Not applicable	Occupied Habitat	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8560	Not applicable	Capture Location - Adult	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8561	Not applicable	Capture Location - Egg	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8562	Not applicable	Capture Location - Larvae	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8563	Not applicable	Capture Location -YOY	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

Justification:

Over the course of a darters life, they 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. Roberts et al. (2016) documented Percina rex to have drifted as far as 55 km. However, movement and dispersal information is generally not available for Shield Darters and Hammerson (2004) notes that although some larvae species may drift significant distances with the current, Turner (2001) found no significant relationship between that behavior and gene flow. Considering separation distances are arbitrary and defining suitable and unsuitable habitat is difficult, a 1 km radius SOA was chosen. Our recommendations do not consider distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for darters.

Roberts, J., P. Angermeier, E. Hallerman. 2016. Extensive dispersal of Roanoke Logperch (Percina rex) inferred from genetic marker data. Ecology of Freshwater Fish 25: 1-16.

Roberts, J.H. and P.L. Angermeier. 2007. Spatiotemporal variability of stream habitat and movement of three species of fish. Oecologia 151:417-430.

Turner, T.F. 2001. Comparative study of larval transport and gene flow in darters. Copeia

2001:766-774

Last researched by: Collenburg

Date researched: 9/26/2023

Actinopterygii

Shortnose Sturgeon
Acipenser brevirostrum

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4931	Freshwater	Summering Area - Juvenile Sighting	10 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4932	Freshwater	Overwintering Area - Juvenile Sighting	10 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4933	Freshwater	Migration Corridor - Juvenile Sighting	10 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4934	Freshwater	Nursery Area - Young-of-year Sighting	5 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4935	Freshwater	Migration Corridor - Adult Sighting	30 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4936	Freshwater	Spawning Area - Adult Sighting	30 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4937	Freshwater	Summering Area - Adult Sighting	30 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4938	Freshwater	Nursery Area - Larvae Sighting	5 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4939	Freshwater	Spawning Area - Egg Sighting	300 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4940	Freshwater	Overwintering Area - Adult Sighting	10 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes

Justification:

Within the Delaware River, shortnose sturgeon have a complex life cycle wherein they may, depending on life stage, migrate between overwintering areas within the upper tidal portion of the river near Trenton, spawning areas upstream within the nontidal portion, and additional areas for foraging and migration as far south as Philadelphia and northern reaches of the Delaware Bay. Shortnose sturgeon have limited movements and a restricted home range within their river and estuary (Kynard 1997), thus only the Delaware River, Hudson River and Delaware Bay proper and no tributaries, are to be included within the species occurrence area.

Literature:

Kynard, Boyd. 1997. Life history, latitudinal patterns, and status of the shortnose sturgeon, Acipenser brevirostrum. Environmental Biology of Fishes. 48: 319-334.

Young-of-year are non-migratory for about 1 year (residency period within the nursery area). Juveniles show similar spatio-temporal patterns of habitat use as adults (similarity of home ranges). Spawning adults typically travel 200 km or more upstream.

O'Herron, J.C., K.W. Able, and R.W. Hastings. 1993. Movements of shortnose sturgeon (Acipenser brevirostrum) in the Delaware River. Estuaries. 16 (2): 235-240.

Typical overwintering movements were localized between 0.6 - 9.6 km (mean = 4.6 km). Spawning to post-spawning movement = 10 - 30 km.

Seibel, D. 1993. Habitat selection, movements, and response to illumination of shortnose sturgeon in the Connecticut River. Masters Thesis, University of Massachusetts, Amherst, Massachusetts.
As cited within: National Marine Fisheries Service. 1998. Recovery Plan for the Shortnose Sturgeon (Acipenser brevirostrum). Prepared by the Shortnose Sturgeon Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 104 pages. p. 28.

In the Connecticut River, adult and juvenile summer home ranges are about 10 km. Winter range is usually less than 2 km.

Last researched by: Davenport

Date researched: 2/1/2007

Actinopterygii

Slimy Sculpin
Cottus cognatus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8926	Not applicable	Occupied Habitat	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8518	Not applicable	Capture Location - Adult	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8519	Not applicable	Capture Location - Egg	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8520	Not applicable	Capture Location - Larvae	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8521	Not applicable	Capture Location -YOY	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

Justification:

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); but are also poor swimmers (Robinson et al. 2021). In New Jersey, they are a bottom-dwelling fish found in coldwater streams, almost always associated with wild trout. They lack a swim bladder and appear to hop when moving from one location to another. Their dispersal can be quite restricted as well. Gray et al. (2004) documented, in a study of the Little River in Canada, that slimy sculpin displayed site-fidelity related to a very small home range and even in a case where groups were separated by only 200 m, there was no evidence to suggest movement between the groups. In a tagging study by Cunjak et al. (2005), it was documented that the maximum distance traveled for recaptured sculpin was 101 m, no tagged fish was found outside the 170 m study area, and 75% of the recaptured sculpin moved < 38 m. Considering separation distances are arbitrary and defining suitable and unsuitable habitat is difficult (Hammerson 2004), a 1 km radius SOA was chosen. Our recommendations do not consider distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Cunjak, R.A., J.M. Roussel, M.A. Gray, J.P. Dietrich, D.F. Cartwright, K.R. Munkittrick, and T.D. Jardine. 2005. Using stable isotope analysis with telemetry or mark-recapture data to identify fish movement and foraging. Oecologia 144:636-646.

Edwards, P.A. and R.A. Cunjak. 2007. Influence of water temperature and streambed stability on the abundance and distribution of slimy sculpin (Cottus cognatus). Environmental Biology of Fish 80:9-22.

Gray MA, Cunjak RA, Munkittrick KR. 2004. Site fidelity of slimy sculpin (Cottus cognatus): insights from stable carbon and nitrogen analysis. Can J Fish Aquat Sci. 61(9): 1717-1722.

Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for Freshwater Sculpins.

Robinson, K.F. C.R. Bronte, D.B. Bunnell, P.T. Euclide, D.W. Hondrop, J.A. Janssen, M.S. Kornis, D.H. Ogle, W. Otte, S.C. Riley, M. R. Vinson, S.L. Volkel, and B.C. Weidel. 2021. A synthesis of the biology and ecology of sculpin species in the Laurentian Great Lakes and implication for the adaptive capacity of the benthic ecosystem. Reviews in Fisheries Science and Aquaculture 29(1):96-121.

Last researched by: Collenburg

Date researched: 9/26/2023

Amphibia

Blue-spotted Salamander
Ambystoma laterale

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4748	Not applicable	On Road	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4749	Not applicable	Vernal Pool Breeding	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4750	Not applicable	Non-breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4751	Not applicable	Vernal Pool Non-breeding	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8378	Not applicable	Occupied Habitat	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Vernal habitats are utilized by a wide variety of amphibian species. A single vernal habitat and its surrounding upland component serve as critical habitat for a diversity of Ambystomid salamanders, including A. laterale. ENSP has determined that a buffer of 300 meters for both breeding (vernal habitat) and non-breeding (upland component) habitat provides protection for a high percentage of the species year-round range. The majority of Ambystomid salamanders breed in vernal pools in the spring for a limited number of weeks and then return to the uplands for the remainder of the year. Occurrences designated as non-breeding will mostly occur within 300 meters of a breeding habitat and therefore the occurrence area radii are the same for both feature labels.

Literature:

Bishop, S. C. 1941. The Salamanders of New York. Bulletin 324. Albany, NY: The New York State Museum.

Dispersals recorded past 250 m away from suitable breeding habitats.

Brown, L.J. and R.R. Jung. 2005. An Introduction to Mid-Atlantic Seasonal Pools, EPA/903/B-05/001. U.S. Environmental Protection Agency, Mid-Atlantic Integrated Assessment, Ft. Meade, Maryland. Page 10.

Seasonal pool terrestrial habitat buffer recommendation.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

Inferred minimum extent of habitat use for this species is 300 meters.

Regosin, J.V., B.S. Windmiller, R.N. Homan, and J.M. Reed. 2005. Variation in terrestrial habitat use among four pool-breeding amphibian species and its conservation implications. Journal of Wildlife Management 69:1481-1493.

Dispersal of > 100 meters by 52% of a blue-spotted salamander population.

Semlitsch, R. D., and J. R. Bodie. 2003. Biological Criteria for Buffer Zones around Wetlands and Riparian Habitats for Amphibians and Reptiles. Conservation Biology 17(5): 1219-1228.

Documents home ranges surrounding breeding sites up to 290 meters.

Williams, P.K. 1973. Seasonal movements and population dynamics of four sympatric mole salamanders, genus Ambystoma. Unpublished PhD. dissertation, Indiana University.

Documents dispersal distances of various Ambystomid salamanders.

Last researched by: Zarate

Date researched: 1/1/2006

Amphibia

Carpenter Frog
Lithobates virgatipes

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5083	Not applicable	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5084	Not applicable	Vernal Pool Non-breeding	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5085	Not applicable	On Road	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5086	Not applicable	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5087	Not applicable	Occupied Habitat	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5088	Not applicable	Vernal Pool Breeding	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. For many species that value habitat patches in the Landscape Project maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In these cases, a default occurrence area (71.25 meter radius) is applied to take into account location uncertainty. These occurrence areas are used to value patches of habitat.

Literature:

N/A

N/A

Last researched by: Zarate

Date researched: 1/1/2007

Amphibia

Cope's Gray Treefrog
Dryophytes chrysoscelis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4919	Not applicable	Non-breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4920	Not applicable	Vernal Pool Breeding	300 Meter Buffer from Pool Edge	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4921	Not applicable	Vernal Pool Non-breeding	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4923	Not applicable	Occupied Habitat	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4924	Not applicable	Breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7956	Not applicable	On Road	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

All grasslands, wetlands, and upland forests within 300 m of the pond edge are considered to be critical habitat for this species. Sightings of Cope’s gray treefrogs made outside of the breeding period are also buffered by 300 m.

This species is typically associated with wetlands and ponded areas during the breeding season, but is capable of making long distance movements through upland habitats. Breeding habitats include borrow pits, ditches, vernal pools, detention basins, and other natural and human-made ponded areas (Zappalorti 2002). In their 2003 study, Johnson and Semlitsch suggest that a minimum core habitat of 60 m is need around breeding ponds to protect local populations of northern gray treefrogs. Movement distances of up to 200 m were observed in this study. One New Jersey study used radio-telemetry methodologies to determine daily movement distance of Cope’s gray treefrogs. This study found that treefrogs were capable of moving long distances from breeding habitats, with one individual traveling a straight line distance of 401 m in a four-day period (Golden, unpublished data). Mean daily movement distances for Cope’s gray treefrogs in this study were 32 m during the breeding season and 9 m outside of the breeding season. Regular movements of 100 m during the breeding season were observed in one study from Tennessee (Ritke et al. 1991).

Literature:

Johnson, JR and RD Semlitsch. 2003. Defining core habitat of local populations of gray treefrog (Hyla versicolor) based on choice of oviposition site. Oecologia 137:205-210.

N/A

Ritke, ME, JG Babb, and MK Ritke. 1991. Breeding-site specificity in the gray treefrog (Hyla chrysoscelis). Journal of Herpetology 25:123-125.

Zappalorti, RT. 2002. Ecology and breeding habits of Cope's gray treefrog (Hyla chrysoscelis) in the coastal Pine Barrens of southern New Jersey. Unpublished report to NJDEP, Division of Fish and Wildlife by Herpetological Associates.

Last researched by: Golden

Date researched: 1/1/2007

Amphibia

Eastern Cricket Frog
Acris crepitans

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6530	Not applicable	Vernal Pool Non-breeding	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6531	Not applicable	Vernal Pool Breeding	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6532	Not applicable	Non-breeding Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6533	Not applicable	Breeding Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6534	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6535	Not applicable	On Road	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

All wetlands and upland forests within 500 m of the pond edge are considered to be critical habitat for this species. Sightings made outside of the breeding period are also buffered by 500 m. Occurrences designated as non-breeding will mostly occur within 500 meters of a breeding habitat and therefore the occurrence area radii are the same for both feature labels.

Permanent ponds and vernal habitats are utilized by a wide variety of amphibian species. Breeding ponds and the surrounding upland component serve as critical habitat for a diversity of Anurans, including A. crepitans. Semlitsch and Bodie (2003) identified a "core habitat" for amphibians of 290 m from the wetland edge. Although studies have shown that this species will migrate and overwinter within 150 m of the edge of a breeding site (Kenney et al., 2012; Semlitsch and Bodie, 2003), Kenney and Stearns (2013) noted that A. crepitans was regularly seen in upland habitats > 300 m from breeding sites within New York. Although A. crepitans exhibits high breeding site fidelity, individuals must occasionally disperse among populations up to 10 km, creating a larger metapopulation (Kenney et al., 2013; Semlitsch, 2008).

Literature:

Kenney G, McKean K, Martin J, Stearns C. 2012. Identification of terrestrial wintering habitat of Acris crepitans (Northern Cricket Frog). Northeastern Naturalist. 19(4):698-700.

Daily movements of 53 individual A. crepitans tracked using fluourescent powder ranged from 0.25-47.6 m. Three individuals were tracked to two overwintering burrows 87 m and 140 m from breeding ponds.

Kenney, Gregg, and Cory Stearns. 2013. Draft Recovery Plan of New York State Populations of the Northern Cricket Frog (Acris crepitans). New York State Department of Environmental Conservation.

Discusses A. crepitans being regularly seen using a variety of habitat over 300 m from breeding sites, with one individual seen 515 m from a breeding site. The greatest between-pond movement documented in this report was 1.3 km.

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org.

Inferred minimum extent of habitat use for this species is 500 meters.

Semlitsch RD. 2008. Differentiating migration and dispersal processes for pond-breeding amphibians. Journal of wildlife management. 72(1):260-7.

Discusses the differences in amphibian annual migration movements between breeding and non-breeding habitats (generally <1 km) with dispersal distances between breeding sites or within metapopulations (>1-10 km).

Semlitsch, R. D., and J. R. Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17:1219-1228.

Identifies a “core habitat” for amphibians of 290 m from a wetland edge.

Last researched by: Zarate

Date researched: 3/22/2018

Amphibia

Eastern Long-tailed Salamander
Eurycea longicauda longicauda

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4911	Not applicable	Non-breeding Sighting	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4912	Not applicable	Vernal Pool Non-breeding	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4913	Not applicable	On Road	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4914	Not applicable	Occupied Habitat	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4915	Not applicable	Breeding Sighting	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4916	Not applicable	Vernal Pool Breeding	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Very little primary literature exists on the life history of Eurycea l. longicauda. Much of the information we know about E. longicauda derives from the occurrence data in ENSP's Biotics Database. Ongoing research and personal observations have also contributed to the development of the current occurrence area.

Literature:

Anderson and Martino. 1966. The Life History of Eurycea l. longicauda Associated with Ponds. The American Midland Naturalist 75(2): 257-279.

A unique association of E. longicauda with limestone sink ponds, also breeding areas for Ambystomid salamanders, exists in New Jersey.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

Inferred minimum extent of habitat use for this species is 100 meters.

Last researched by: Zarate

Date researched: 1/1/2006

Amphibia

Eastern Spadefoot

Scaphiopus holbrookii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6951	Not applicable	On Road	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6952	Not applicable	Non-breeding Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6953	Not applicable	Vernal Pool Breeding	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6954	Not applicable	Vernal Pool Non-breeding	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8379	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

All wetlands and upland forests within 500 m of the pond edge are considered to be critical habitat for this species. Sightings made outside of the breeding period are also buffered by 500 m. ENSP has determined that a buffer of 300 meters for both breeding (vernal habitat) and nonbreeding (upland component) habitat provides protection for a high percentage of the species year-round range. Some longer-range dispersal suggests that a buffer of 500 meters may be more appropriate for this species. Occurrences designated as non-breeding will mostly occur within 500 meters of a breeding habitat and therefore the occurrence area radii are the same for both feature labels.

Vernal habitats are utilized by a wide variety of amphibian species. A single vernal habitat and its surrounding upland component serve as critical habitat for a diversity of Anurans, including S. holbrookii. Semlitsch and Bodie (2003) identified a "core habitat" for amphibians of 290 m from the wetland edge. Estimates of S. holbrookii home ranges are small (average 10 m^2; Pearson, 1955), with most movements constrained to within 130 m (Greenberg and Tanner 2004; Greenberg and Tanner, 2005; Timm et al., 2014). Some longer movements have been seen, especially over longer timeframes (Greenberg and Tanner 2005; Timm et al., 2014), and S. holbrookii may shift their home ranges based on the locations of actively used burrows (Pearson, 1955), but few if any movements have been observed over 500 m. Therefore, a buffer of 500 m on a sighting of S. holbrookii will likely encompass the majority of the local population.

Literature:

Greenberg CH, Tanner GW. 2004. Breeding pond selection and movement patterns by eastern spadefoot toads (Scaphiopus holbrookii) in relation to weather and edaphic conditions. Journal of Herpetology. 38(4):569-77

Greenberg CH, Tanner GW. 2005. Spatial and temporal ecology of eastern spadefoot toads on

a Florida landscape. Herpetologica. 61(1):20-8.

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org.

Pearson PG. 1955. Population ecology of the spadefoot toad, Scaphiopus h. holbrooki (Harlan). Ecological Monographs. 25(3):233-67.

Semlitsch, R. D., and J. R. Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17:1219-1228.

Timm BC, McGarigal K, Cook RP. 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.

Last researched by: Zarate

Date researched: 4/7/2018

Amphibia

Eastern Tiger Salamander
Ambystoma tigrinum

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4907	Not applicable	Non-breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4908	Not applicable	Vernal Pool Breeding	300 Meter Buffer from Pool Edge	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
4909	Not applicable	Vernal Pool Non-breeding	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4910	Not applicable	On Road	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8380	Not applicable	Occupied Habitat	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

All emergent habitat types (forest, wetland forest, emergent wetland and adjacent barren land) within 300 m of a pond edge are designated as critical habitat. In the brief "non-breeding" period, those habitats within 300 m of a sighting are designated as critical habitat.

Large terrestrial areas adjacent to wetlands are used by adult pond-breeding salamanders and newly metamorphosed juveniles through the majority of the year. Semlitsch and Bodie (2003) identified a "core habitat" for amphibians of 290 m from the wetland edge. They based this figure on studies that found adult tiger salamanders move up to 300 m from breeding ponds (Semlitsch 1983, Madison and Farrand 1998). Salamanders tracked by radio-telemetry made all movements within 300 m of the breeding pond; the greatest movements were by those animals tracked the longest (Madison and Farrand 1998). They found salamanders moved in all directions within wooded areas, but avoided grassy fields, paved roads, and commercial areas. Habitat within 300 m of the pond is critical to survival: for a related species, marbled salamander (A. opacum), upland survival is much better in forested habitat than in old-field (Taylor et al. 2005). In NJ, many breeding ponds are located in abandoned sand/gravel pits where the 300 m area includes some barren land cover type.
Tiger salamanders found >300 m from a breeding pond in the non-breeding season (8/1-9/30) may represent movement between ponds, and the habitat should be considered a corridor for interaction of nearby populations.

Literature:

Madison, D.M., and L. Farrand. 1998. Habitat use during breeding and emigration in radio-implanted tiger salamanders, Ambystoma tigrinum.

N/A

Semlitsch, R. D. 1983. Burrowing ability and behavior of salamanders of the genus Ambystoma. Canadian Journal of Zoology 61:616-620.

N/A

Semlitsch, R. D., and J. R. Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17:1219-1228.

N/A

Taylor, B. E., D. E. Scott, and J. W. Gibbons. 2005. Catastrophic reproductive failure, terrestrial survival, and persistence of the marbled salamander. Conservation Biology 20:792-801.

N/A

Last researched by: Golden

Date researched: 1/1/2007

Amphibia

Jefferson Salamander
Ambystoma jeffersonianum

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5077	Not applicable	Non-breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5078	Not applicable	Vernal Pool Breeding	300 Meter Buffer from Pool Edge	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5079	Not applicable	Vernal Pool Non-breeding	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5080	Not applicable	On Road	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8381	Not applicable	Occupied Habitat	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Vernal habitats are utilized by a wide variety of amphibian species. A single vernal habitat and its surrounding upland component serve as critical habitat for a diversity of Ambystomid salamanders, including A. jeffersonianum. ENSP has determined that a buffer of 300 meters for both breeding (vernal habitat) and non-breeding (upland component) habitat provides protection for a high percentage of the species year-round range. The majority of Ambystomid salamanders breed in vernal pools in the spring for a limited number of weeks and then return to the uplands for the remainder of the year. Occurrences designated as non-breeding will mostly occur within 300 meters of a breeding habitat and therefore the occurrence area radii are the same for both feature labels.

Literature:

Bishop, S. C. 1941. The Salamanders of New York. Bulletin 324. Albany, NY: The New York State Museum.

Dispersals recorded as far as 1,610m away from suitable breeding habitats.

Brown, L.J. and R.R. Jung. 2005. An Introduction to Mid-Atlantic Seasonal Pools, EPA/903/B-05/001. U.S. Environmental Protection Agency, Mid-Atlantic Integrated Assessment, Ft. Meade, Maryland. Page 10.

Seasonal pool terrestrial habitat buffer recommendation.

Faccio, S. D. 2003. Postbreeding emigration and habitat use by Jefferson and spotted salamanders in Vermont. Journal of Herpetology 37:479-489.

Documents dispersal distances up to 355m in one movement and macro habitat preferences.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

Inferred minimum extent of habitat use for this species is 300 meters.

Semlitsch, R. D., and J. R. Bodie. 2003. Biological Criteria for Buffer Zones around Wetlands and Riparian Habitats for Amphibians and Reptiles. Conservation Biology 17(5): 1219-1228.

Documents home ranges surrounding breeding sites up to 290 meters.

Williams, P.K. 1973. Seasonal movements and population dynamics of four sympatric mole salamanders, genus Ambystoma. Unpublished PhD. dissertation, Indiana University.

Documents dispersal distances of various Ambystomid salamanders.

Last researched by: Zarate

Date researched: 1/1/2006

Amphibia

Marbled Salamander
Ambystoma opacum

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5073	Not applicable	Vernal Pool Breeding	300 Meter Buffer from Pool Edge	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5074	Not applicable	Vernal Pool Non-breeding	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5075	Not applicable	Non-breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5076	Not applicable	On Road	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8382	Not applicable	Occupied Habitat	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Vernal habitats are utilized by a wide variety of amphibian species. A single vernal habitat and its surrounding upland component serve as critical habitat for a diversity of Ambystomid salamanders, including A. opacum. ENSP has determined that a buffer of 300 meters for both breeding (vernal habitat) and non-breeding (upland component) habitat provides protection for a high percentage of the species year-round range. The majority of Ambystomid salamanders breed in vernal pools in the spring for a limited number of weeks and then return to the uplands for the remainder of the year. Marbled salamanders, on the other hand, breed in the fall at vernal pools. Occurrences designated as non-breeding will mostly occur within 300 meters of a breeding habitat and therefore the occurrence area radii are the same for both feature labels.

Literature:

Brown, L.J. and R.R. Jung. 2005. An Introduction to Mid-Atlantic Seasonal Pools, EPA/903/B-05/001. U.S. Environmental Protection Agency, Mid-Atlantic Integrated Assessment, Ft. Meade, Maryland. Page 10.

Seasonal pool terrestrial habitat buffer recommendation.

Gamble, L.R., McGarigal, K., Jenkins, C.L., and Timm, B.C. 2006. Limitations of regulated "buffer zones" for the conservation of marbled salamanders. Wetlands 26(2):298-306.

Documents dispersals up to 1,230 meters by marbled salamanders.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

Inferred minimum extent of habitat use for this species is 300 meters.

Semlitsch, R. D., and J. R. Bodie. 2003. Biological Criteria for Buffer Zones around Wetlands and Riparian Habitats for Amphibians and Reptiles. Conservation Biology 17(5): 1219-1228.

Documents home ranges surrounding breeding sites up to 290 meters.

Williams, P.K. 1973. Seasonal movements and population dynamics of four sympatric mole salamanders, genus Ambystoma. Unpublished PhD. dissertation, Indiana University.

Documents dispersal distances of various Ambystomid salamanders, including A. opacum, outwards to 450m.

Last researched by: Zarate

Date researched: 1/1/2006

Amphibia

New Jersey Chorus Frog
Pseudacris kalmi

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5722	Not applicable	Vernal Pool Breeding	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5723	Not applicable	Breeding Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5724	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5725	Not applicable	Vernal Pool Non-breeding	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5726	Not applicable	Non-breeding Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5727	Not applicable	On Road	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

All wetlands and upland forests within 500 m of the pond edge are considered to be critical habitat for this species. Sightings made outside of the breeding period are also buffered by 500 m. Occurrences designated as non-breeding will mostly occur within 500 meters of a breeding habitat and therefore the occurrence area radii are the same for both feature labels.

Vernal habitats are utilized by a wide variety of amphibian species. A single vernal habitat and its surrounding upland component serve as critical habitat for a diversity of Anurans, including P. kamli. Semlitsch and Bodie (2003) identified a "core habitat" for amphibians of 290 m from the wetland edge, with mean distances traveled for Hylids ranging from 55 – 75 m and maximum distances traveled reaching 240 m. Not much information exists on home ranges and movement patterns of P. kalmi, but the majority of movement in other Hylid species occurs within 200 m of breeding ponds (Johnson and Semlitsch, 2003; Rittenhouse and Semlitsch, 2007; Sias, 2006). P. kamli may likely use and travel through habitat > 200 m from a breeding site, especially within a wetland matrix. Therefore most movements of this species would likely be captured within a buffer zone of 500 m from a breeding site.

Literature:

Johnson JR, Semlitsch RD. 2003. Defining core habitat of local populations of the gray treefrog (Hyla versicolor) based on choice of oviposition site. Oecologia. 137(2):205-10.

Suggests a core breeding habitat protection of 60 m for Hyla versicolor. Reports other studies that found typical movements of H. andersonii and P. triseriata within 70 m and 195 m, respectively.

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org.

Inferred minimum extent of habitat use for this species is 500 meters.

Rittenhouse TA, Semlitsch RD. 2007. Distribution of amphibians in terrestrial habitat surrounding wetlands. Wetlands. 27(1):153-61.

Found that 95% of amphibians occur within 664 m of a wetland edge, and 50% within 93 m based on literature review. Peak distribution occurred 30 m from a wetland edge, and one study gave a maximum distance of 213m traveled for P. triseriata.

Semlitsch, R. D., and J. R. Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17:1219-1228.

Identifies a “core habitat” for amphibians of 290 m from a wetland edge.

Sias, J. 2006. Natural History and Distribution of the Upland Chorus Frog, Pseudacris feriarum Baird, in West Virginia. Theses, Dissertations and Capstones. Paper 374.

Reviews literature stating P. triseriata movements typically occurred within 100 m of breeding pools, but movements over 200 m were observed. One study calculated mean home range of 9 males between 641 m^2 and 6,024 m^2.

Last researched by: Zarate

Date researched: 4/7/2018

Amphibia

Northern Spring Salamander
Gyrinophilus porphyriticus porphyriticus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5081	Not applicable	Occupied Habitat	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5082	Not applicable	On Road	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. For many species that value habitat patches in the Landscape Project maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In these cases, a default occurrence area (71.25 meter radius) is applied to take into account location uncertainty. These occurrence areas are used to value patches of habitat.

Literature:

N/A

N/A

Last researched by: Zarate

Date researched: 1/1/2007

Amphibia

Pine Barrens Treefrog
Dryophytes andersonii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4925	Not applicable	Vernal Pool Breeding	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4926	Not applicable	Occupied Habitat	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4927	Not applicable	On Road	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4928	Not applicable	Vernal Pool Non-breeding	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4929	Not applicable	Non-breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4930	Not applicable	Breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

All wetlands, and upland forests within 300 m of the pond edge are considered to be critical habitat for this species. Sightings made outside of the breeding period are also buffered by 300 m.

Breeding habitats for this species are documented to consist of bogs, vernal pools, cedar swamps, and pitch pine lowlands (Means and Longden 1976). Common plant communities associated with breeding ponds contain red maple (Acer rubrum), pitch pine (Pinus rigida), leatherleaf (Chamaedaphne calyculata), fetterbush (Eubotrys racemosa), sheep laurel (Kalmia angustifolia), and highbush blueberry (Vaccinium corymbosum) (Laidig et al. 2001). Mean water depths of 13 Pine Barrens treefrog breeding ponds studied by Laidig et al. (2001) in the New Jersey Pinelands ranged from 30 to 65 cm. The maximum water depth of the same 13 ponds ranged from 55 to 124 cm. While research on the movements of Pine Barrens treefrogs is quite limited, one study found individuals of this species stayed within 72 m of the breeding pools during the breeding season (Freda and Gonzalez 1986). Dispersal distances were slightly higher outside of the breeding season (up to 102 m), but still less than the documented dispersal distances of related species (Johnson and Semlitsch 2003, Golden unpublished data). Because of the small sample size (n=8) of the Freda and Gonzalez study, a buffer distance for sightings on this species were adapted from data published on other treefrog specie

Literature:

Johnson, JR and RD Semlitsch. 2003. Defining core habitat of local populations of gray treefrog (Hyla versicolor) based on choice of oviposition site. Oecologia 137:205-210.

N/A

Laidig, KJ, RA Zampella, JF Bunnell, CL Dow, and TM sulikowski. 2001. Characteristics of selected Pine Barrens treefrog pones in the New Jersey Pinelands. Unpublished reports by the New Jersey Pinelands Commission.

N/A

Means, DB and CJ Longden. 1976. Aspects of the biology and zoogeography of the Pine Barrens treefrog (Hyla andersonii) in northern Florida. Herpetologica 32:117-130.

N/A

Last researched by: Golden

Date researched: 1/1/2007

Amphibia

Spotted Salamander
Ambystoma maculatum

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7969	Not applicable	On Road	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5787	Not applicable	Vernal Pool Breeding	300 Meter Buffer from Pool Edge	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5788	Not applicable	Non-breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5789	Not applicable	Vernal Pool Non-breeding	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8383	Not applicable	Occupied Habitat	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

All wetlands and upland forests within 300 m of the pond edge are considered to be critical habitat for this species. Sightings made outside of the breeding period are also buffered by 300 m. ENSP has determined that a buffer of 300 meters for both breeding (vernal habitat) and nonbreeding (upland component) habitat provides protection for a high percentage of the species year-round range. The majority of Ambystomid salamanders breeds in vernal pools in the spring for a limited number of weeks and then returns to the uplands for the remainder of the year. Occurrences designated as non-breeding will mostly occur within 300 meters of a breeding habitat and therefore the occurrence area radii are the same for both feature labels.

Vernal habitats are utilized by a wide variety of amphibian species. A single vernal habitat and its surrounding upland component serve as critical habitat for a diversity of Ambystomid salamanders, including A. maculatum. Semlitsch and Bodie (2003) identified a "core habitat" for amphibians of 290 m from the wetland edge. Studies have shown that A. maculatum disperses and overwinters > 100 m from the breeding site (Faccio, 2003; Regosin et al., 2005). Although A. maculatum exhibits high breeding site fidelity, individuals will occasionally disperse among populations within 4.8 km, creating a larger metapopulation (Zamudio and Wieczorek, 2007)

Literature:

Faccio SD. 2003. Postbreeding emigration and habitat use by Jefferson and spotted salamanders in Vermont. Journal of Herpetology. 37(3):479-89.

Indicates dispersal of 30 m to 219 m in A. maculatum and A. jeffersonianum.

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org.

Inferred minimum extent of habitat use for this species is 300 meters.

Regosin, J.V., B.S. Windmiller, R.N. Homan, and J.M. Reed. 2005. Variation in terrestrial habitat use among four pool-breeding amphibian species and its conservation implications. Journal of Wildlife Management 69:1481-1493.

Indicates overwintering dispersal of >100 m for 60% of spotted salamanders.

Semlitsch, R. D., and J. R. Bodie. 2003. Biological criteria for buffer zones around wetlands and riparian habitats for amphibians and reptiles. Conservation Biology 17:1219-1228.

Identifies a “core habitat” for amphibians of 290 m from a wetland edge.

Zamudio KR, Wieczorek AM. 2007. Fine-scale spatial genetic structure and dispersal among spotted salamander (Ambystoma maculatum) breeding populations. Molecular ecology. 16(2):257-74.

Discusses site fidelity and genetic similarity between populations within a range of 4.8 km.

Last researched by: Zarate

Date researched: 3/22/2018

Aves

American Bittern
Botaurus lentiginosus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4729	Breeding	Nest	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4730	Breeding	Foraging	Need Update	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4731	Breeding	Breeding Sighting	Need Update	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4732	Breeding	Breeding Sighting-Confirmed	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4733	Breeding	Roosting Area	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4734	Nonbreeding	Non-breeding Sighting	Need Update	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

A study in Minnesota determined that the average home range of males and females differed considerably. Males averaged 415 ha while females averaged 337 ha (Brininger 1996). A second study, also conducted in Minnesota, found a significantly smaller average home range (males only) of 127 ha (n=20). However, the average core area (where the bittern was found more than 50% of the time) was only 25 ha (Azure 1998). These two studies led NatureServe to apply a minimum inferred extent of 0.5 km (NatureServe 2006). ENSP will use the NatureServe minimum inferred extent of 0.5 km until such time as that is changed or we have additional information, including New Jersey-specific data, to justify a change in this value.

Literature:

Azure. 1998. Aspects of American bittern ecology in northwestern Minnesota. MS thesis. University if North Dakota, Grand Forks, North Dakota. 139 pgs.

In a Minnesota study where n=20, the average home range of males was 127 ha. The average size of the core use area (defined as the area of the home range where the bittern was located >50% of the time) was 25 ha.

Brininger. 1996. The ecology of the American bittern in northwest Minnesota. MS thesis/ St. Cloud State University, St. Cloud, MN, USA.

In Minnesota, the average home range of males was 415 ha. The average female home range was 337 ha.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

The inferred minimum extent of habitat use (when actual extent is unknown) is 0.5 km. This is based on an average core home range of 25 ha (Azure 1998). Include only the nesting marsh within the boundaries of the inferred extent polygon.

Last researched by: Davis

Date researched: 7/1/2006

Aves

American Kestrel
Falco sparverius

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5182	Breeding	Breeding Sighting	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5184	Breeding	Nest	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5185	Nonbreeding	Non-breeding Sighting	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

This species has small breeding territories but are area sensitive. The buffer was chosen based on breeding territory size and increased for the species' mobility and need for large patches. Until more is discovered about the mobility of the species, a 100 meter radius buffer will be used.

Literature:

Smallwood, J. A., and D. M. Bird. 2002. American Kestrel (Falco sparverius). In The Birds of North America, No. 602 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA

Tend to occupy areas > 25 ha in size. Little information is available on breeding territory size, but estimates from breeding densities indicate territories may range from 0.5 - 1 ha.

Migratory stopover habitat consists of open patches. Wintering habitat is similar to breeding habitat but with more woody vegetation. Winter territories range from 1.4 - 3.5 km.

Last researched by: Petzinger

Date researched: 1/1/2006

Aves

American Oystercatcher
Haematopus palliatus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5237	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
5238	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5239	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
5240	Breeding	Nesting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5241	Breeding	Nest	750 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes

Justification:

There is very little information available for home ranges and foraging commutes of American oystercatchers. Nol and Humphrey (1994) report that feeding areas may be further than 1600 m from nesting areas. Tom Virzi of Rutgers University (Virzi 2008) reports that he has observed foraging adults up to 1 km, and rarely up to 2 km, from their nesting sites. Natureserve recommends a buffer of 1.5 km when actual extent is unknown (NatureServe 2007). ENSP will use the NatureServe minimum inferred extent of 1.5 km until such time as that is changed or we have additional information, including New Jersey-specific data, to justify a change in this value.

Literature:

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 4, 2007).

The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 1.5 km.

Nol, E. and R. C. Humphrey. 1994. American Oystercatcher (Haematopus palliatus). In The Birds of North America, No. 82 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Feeding territories may be in excess of 1,600 m from breeding territories. Maximum distance observed traveling during breeding season in Massachusetts about 3 km.

Virzi, T. 2008. Effects of urbanization on the distribution and reproductive performance of the American oystercatcher (Haematopus palliatus palliatus) in coastal New Jersey.

Unpublished doctoral dissertation, Rutgers University, New Brunswick.

Last researched by: Davis

Date researched: 1/1/2007

Aves

Bald Eagle
Haliaeetus leucocephalus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4871	Nonbreeding	Roosting Area	Hand Digitized Polygon	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4872	Nonbreeding	Concentration Area	Hand Digitized Polygon	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4873	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4874	Breeding	Foraging	Bald Eagle Foraging Model	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4875	Breeding	Nest	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4876	Breeding	Breeding Sighting	Need Update	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
8935	Breeding	Roosting Area	Hand Digitized Polygon	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
8358	Nonbreeding	Wintering	250 foot radius buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes

Justification:

All habitats (forest, field, wetlands) within 1 km of a nest are designated as critical habitat for bald eagles. 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 local data are lacking.

Bald eagle foraging habitat is defined as the amount of 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 and other aquatic species, but usually do so from perches along the water’s edge (Stalmaster 1987). The model calculates open water area by increasing the radius around each nest incrementally one cell (30 m) at a time until an area of 660 ha of foraging habitat has been identified.

Foraging habitat is defined as all open water bodies greater than 8 ha. A 90 m buffer is applied to the identified waters to protect perching sites. All suitable habitat patches (i.e., forest and forested wetlands) that intersect with the foraging habitat and 90 m buffer are designated as critical for eagles.

Roosting areas are locations where bald eagles gather and perch overnight, usually sites with large trees that are relatively sheltered from wind and proximate to foraging areas. Roosts are often located in remote areas, along shorelines, or up creeks and wetlands where they may not be easily visible to observers. Roost areas may be identified with help from satellite telemetry of eagles, and confirmed by ground surveys that count eagles arriving near sunset and leaving after sunrise. Eagles use some roosts seasonally to access prey resources nearby, but others may be used communally in all seasons of the year. Roosting Area-NB refers to roosts with documented use by >1 eagle during the non-breeding season only; Roosting Area-B refers to roosts with documented use by >1 eagle during the breeding season of January through July.

Wintering sites were identified using specific Eagle Midwinter Survey data and biologist interpretation of essential habitat, as well as recorded sightings of eagles during the winter period of November 1-January 31. Patches of suitable habitat (forest, forested wetlands, and open waters) within 500 meters of each site are designated as critical habitat. This habitat designation was not applied in Landscape Version 1 or 2, but will be included in Landscape Version 3.

From Birds of North America (Buehler 2000): 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: About 1 nest/1.6 km of shoreline reported historically on Chesapeake Bay (Kirkwood 1895).

Literature:

Buehler, D. A. 2000. Bald Eagle (Haliaeetus leucocephalus). In The Birds of North America, No. 506 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

N/A

Harmata, A. R., and G. J. Montopoli. 2001. Analysis of bald eagle spatial use of linear habitat. J. Raptor Res. 35(2):207-213.

Primary foraging areas may need protection to maintain performance of eagles nesting along rivers.

Stalmaster, M. V. 1987. The Bald Eagle. Universe Books, New York. 227 p. Buehler, D. A. 2000. Bald Eagle (Haliaeetus leucocephalus). In The Birds of North America, No. 506 (A. Poole and F. Gill, eds.). The Birds of North America Inc., Philadelphia, PA.

Home range sizes are variable (in Florida, 2–8 km2, larger in other areas, as small as 1 km2 in some). Minimum territory size in Saskatchewan was 4 km2 (Gerrard et al. 1992, in Buehler 2000). Wintering habitat is defined by food availability, presence of roost sites that provide protection from weather and absence of human disturbance (Buehler 2000).

Therres, G. D., M. A. Byrd, D. S. Bradshaw. 1993. Transactions of the North American Wildlife and Natural Resources Conference, 58:62-69.

The effects of development activities on nesting bald eagles depend on the distance of the activities from the nest, the view the eagles have of the activities and the time of year the development occurs. Other factors that may contribute include the nesting history of the eagles, the birds' previous experience with humans, the availability of alternative nest sites and the amount of development in the area.

Last researched by: Clark

Date researched: 12/15/2021

Aves

Bank Swallow
Riparia riparia

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7877	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
7294	Breeding	Breeding Sighting-Confirmed	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7296	Breeding	Breeding Sighting	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Adults tend to forage within 200 m from their nests. Therefore, the 200 m will be used as the radius.
"Aerial feeder over lakes, ponds, rivers and streams, meadows, fields, pastures, and bogs; occasionally over forests and woodlands (Stoner 1936, Gross 1942, Turner and Rose 1989a). When breeding, feeding sites usually are within 200 m of where young fed, but this distance may vary depending on availability of foraging areas (Mead 1979a, Turner 1980).
Presently breeds primarily in lowland areas along ocean coasts, rivers, streams, lakes, reservoirs, and wetlands (Cramp 1988, Turner and Rose 1989a, Am. Ornithol. Union American Ornithologists' Union 1998a). Vertical banks, cliffs, and bluffs in alluvial, friable soils characterize nesting-colony sites throughout North America. Nesting colonies also found in artificial sites such as sand and gravel quarries and road cuts. Historically, all colonies in North America were found in natural sites such as banks along rivers, streams, lakes, and coasts; today, many colonies are in human-made sites.
Most rivers and streams with nesting habitats are low-gradient, meandering waterways with eroding streamside banks. In coastal areas and lakeshores, waves caused by storms, tidal action, and wind erode banks, cliffs, and bluffs, creating vertical faces. Foraging habitats surrounding nesting colony include wetlands, open water, grasslands, riparian woodlands, agricultural areas, shrublands, and occasionally upland woodlands. A freshwater or saltwater source is often nearby, but association is likely due to its role as source of soil deposition (freshwater) or erosive force. Bank Spallows tend to avoid dense forests and woodlands, deserts, montane areas, and alpine areas because of paucity of suitable nesting habitat.
Altitudinal range extends from sea level to about 2,100 m in California (BAG), and from sea level to 900 m in British Columbia (Campbell et al. 1997b). Most nesting colonies, however, are located in lowland alluvial valleys and coastal areas. No clear differences among subspecies in preferred breeding habitats.
The Bank Swallow's scientific name - Riparia riparia - aptly describes its affinity for nesting in the streamside (riparian) banks and bluffs of rivers and streams. This species is a highly social land-bird with a Holarctic breeding distribution. It nests in colonies ranging from 10 to almost 2,000 active nests. One of only a few passerines with an almost cosmopolitan distribution, it is one of the most widely distributed swallows in the world. In the Old World, this species is known as the Sand Martin.
Throughout much of its western North American breeding range, the Bank Swallow nests in erodible soils on vertical or near-vertical banks and bluffs in lowland areas dominated by rivers, streams, lakes, and oceans. In eastern North America, however, many colonies are found in sand and gravel quarries. The size and longevity of colony sites depend greatly on erosion to maintain nesting-habitat suitability. The ephemeral nature of the nesting banks results in relatively low levels of nest-site fidelity, since there is little evolutionary benefit to maintaining long-term ties to specific colony sites."

Literature:

Garrison, B. A. (1999). Bank Swallow (Riparia riparia), version 2.0. In The Birds of North America (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.414

Last researched by: Petzinger

Date researched: 12/24/2018

Aves

Barn Owl
Tyto alba

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5192	Breeding	Breeding Sighting	1500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5193	Breeding	Breeding Sighting-Confirmed	1500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5197	Nonbreeding	Non-breeding Sighting	1500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The breeding buffer was chosen based upon the average home range size of 717 ha in NJ (Marti et al. 2005). This species is highly mobile and essentially use the same wintering habitat as breeding habitat (Marti et al. 2005), so the nonbreeding buffer was chosen to be the same as the breeding buffer.

Literature:

Marti, C.D., A.F. Poole, and L.R. Bevier. 2005. Barn Owl (Tyto alba). In The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Barn_Owl/.

Immatures disperse widely in all directions from the natal site at distances up to 1,900 km (Stewart 1952, Soucy 1980, Marti 1999). Dispersal distances for individuals banded as nestlings in Utah ranged from 1-1,267 km (mean = 102.9 km ± 162.03 SD); females banded as nestlings bred at distances on average of 61.4 km ± 52.04 from their natal site, significantly farther than males (mean = 35.7 km ± 36.61) (Marti 1999). One nestling banded in an Ohio nest was recovered 1,070 km to the northeast while its nest mate was found 800 km to the southeast (Dexter 1957). Dispersal of young in all compass directions also detected in Europe (Glutz von Blotzheim 1979, Bairlein 1985, Matics 2003). Time of fledging did not influence the direction of dispersal in Hungary and the sexes did not differ in direction of dispersal (Matics 2003). Direction of dispersal was strongly affected by major topographic features in Utah (Marti 1999).

Fidelity To Breeding Site And Winter Home Range
Typically nest at the same site as long as they live (Colvin et al. 1984, Marti 1999). Occasionally, change nest sites but do not move long distances to do so (Colvin et al. 1984, Marti 1999); those few breeders that changed nest sites from one year to the next in Utah moved on average 2.28 km ± 1.77 SD; no significant difference in distance between the sexes but females were >5 times as likely as males to make those moves (Marti 1999). Many pairs occupy the same area year-round in Utah and England and often roost in the nest site in winter (Bunn et al. 1982, Marti, pers. obs.).

Home Range

Highly variable, apparently in relation to prey density and habitat characteristics. Home ranges of radio-tagged individuals in New Jersey averaged 717 ha; maximum distance from roost to hunting areas was 5.6 km (Hegdal and Blaskiewicz 1984). Mean home range size in Virginia was 294 ha (Rosenburg 1986), 369 ha in Texas (Byrd 1982), and 308 ha in Scotland (Taylor 1994). In France, radio-tagged breeding males had home range size of >750 ha of which about 250 ha were used on any one night (Michelat and Giraudaux 1991).

Roulin, A. 2002. Offspring desertion by double-brooded female barn owls. The Auk 119(2): 515-519.

I recorded 479 first clutches and 42 second clutches between 1991 and 2000 (Table 1). Thirty-nine females and 23 males were involved in two breeding attempts. That difference between the sexes is explained by the more frequent offspring desertion by females (18 out of 39 double-brooded individuals, 46%) than males (1 out of 23, 4%; chi-square test: $\chi 2 = 11.2$, df = 1, P = 0.001). Among the 21 nondeserting females, 14 of them changed their nest box to lay the second clutch (Table 1). Therefore, 32 out of 39 (82%) double-brooded females used two nest boxes the same year. Among deserting females, the two nests were located at a distance of 4 km (median; range = 1.5-10 km), and among nondeserting females that changed their nest box the median distance was 0.5 km (range is 2 m to 2.5 km) (Mann-Whitney U-test, U = 8.5, n1 = 14, n2 = 17, P < 0.001). In the case where two nest boxes were fastened to the same barn, six double-brooded females used them both and four females used only one of the two boxes.

Last researched by: Petzinger

Date researched: 9/30/2008

Aves

Barred Owl
Strix varia

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4740	Roost	Roosting Area	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4742	Breeding	Breeding Sighting	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4744	Nonbreeding	Non-breeding Sighting	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4747	Breeding	Nest	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

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 (below) illustrate this variability. As year-round residents to NJ, the barred owls are protected during both the breeding and non-breeding seasons. As such, Elody and Sloan's, 1985, estimate of home range during the non-breeding season (282 ha) was incorporated into the ENSP's determination of an appropriate occurrence area depicting critical habitat. Using the home ranges 228.6 ha, 507.8 ha, and 282 ha (Nichols and Warner 1972, Fuller 1979, and Elody and Sloan 1985, respectively), the mean home range is 339.47 ha, equivalent to 1.04 km radius. Landscape species occurrence areas are not represented by proportional figures, therefore the ENSP has accepted a conservative estimate by rounding this range territory to a 1 km radius (314 ha).

Literature:

Elody, B.J. and N.F. Sloan. 1985. Movements and habitat use of barred owls in the Huron Mountains of Marquette County, Michigan, as determined by radiotelemetry. Jack-pine Warbler 63(1):3-8.

Average home range size was 282 ha which decreased to 118 ha during the breeding season.

Fuller, M.R. 1979. Spatiotemporal ecology of four sympatric raptor species. Ph.D. Dissertation. University of Minnesota, St. Paul. 396 pp.

Average cumulative home range, based on minimum area, was 507.8 ha.

Mazur, K. M., and P. C. James. 2000. Barred Owl (Strix varia). In The Birds of North America, No. 508 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Nichols, T.H. and D.W. Warner. 1972. Barred owl habitat use as determined by radiotelemetry. J. Wildlife Manage. 36(2):213-224.

Average home range was 228.6 ha, with a range of 86.1-369.0 ha.

Last researched by: Craddock

Date researched: 1/1/2006

Aves

Bicknell's Thrush
Catharus bicknelli

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8594	Nonbreeding	Non-breeding	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Because only migrants occur in NJ and little is known about the foraging behaviors during migration, the default buffer size will be used.

“A nocturnal, long-distance migrant. Field identification during migration is exceedingly difficult and examination of hand-held birds is the only reliable means of separating migrants of the two species. Use of geolocators to record locations of migrating individuals (n = 22) has greatly clarified routes and timing of migration. Both geolocator data and analysis of specimen and banding data, using wing chord as identification criterion (<94 mm = Bicknell's; >98 mm = Gray-cheeked), suggest elliptical southern portion of migratory route between North American breeding grounds and Greater Antillean overwintering range (VCE). Most southbound migrants depart the East Coast between the mid-Atlantic states and Carolinas on an overwater flight to Greater Antilles, although fall records south of Virginia are scarce. Northward passage appears to be more concentrated through the Southeast, as spring specimens from Florida, Georgia, both Carolinas, and Virginia outnumber fall records by nearly 2:1; these records supported by geolocator-based estimates of spring flight patterns. Entire migration in both directions concentrated east of Appalachian Mtns.

Based on geolocator data, departure from overwintering grounds in the Greater Antilles occurs 28 April–7 May (n= 22; McFarland et al. In Prep). Male birds are still present in the Dominican Republic by 24 Apr based on vocal surveys and mist net captures, and have been observed as late as 9 May (J. Townsend unpubl.). Individuals observed and captured between 15 Apr and 24 Apr (n = 10) showed high levels of fat deposition (J. Townsend unpubl.) and displayed frequent diurnal vocalization, in contrast to early winter when this species vocalizes almost exclusively at dawn and dusk. Individuals are commonly observed singing their full breeding season song on wintering sites during mid- and late-April (J. Townsend unpubl.). Mean duration of spring migration 17 ± 4 d, with little evidence of extended stopovers (McFarland et al. In Prep). No verifiable U.S. records prior to May. In e.-central Florida, migrants pass northward first half of May, based on identification of specimens (n = 2; Wallace 1939), nocturnal flight calls (n = 8 birds; Evans 1994e), and birds in hand (n = 2 birds captured 8 May and 11 May; Brand et al. 2005); earliest specimen record is 3 May in Brevard Co. (Wallace 1939). No records from Florida's west coast or other Gulf Coast states. Only one reliable spring record from Georgia, a male collected on McQueen's I., Chatham Co., 8 May 1949 (Georgia Museum Natural History specimen data). Three verifiable spring specimens from South Carolina: two near Charleston 10 and 15 May, one inland at Chester 6 May (Charleston Museum specimen data). Spring migrants of the Bicknell's/Gray-cheeked thrush complex in North Carolina have been recorded 24 Apr to 30 May, with two unsubstantiated Mar reports; 50% pass in a 15-d period mid-May (Lee 1995c). The only Bicknell's specimen considered authentic was taken near Southport, Brunswick Co., 12 May 1939 (Lee 1995c), although three additional specimens were reported by Wallace (Wallace 1939) collected 5–18 May. Three specimen records reported for the Virginia coastal plain 17–21 May (Wallace 1939).

Bulk of confirmed (on basis of wing length) spring migrants recorded between Maryland and New England. Two specimens from Washington, D.C. on 16 and 27 May; two from Laurel, Maryland, both 14 May (Wallace 1939). Ten Bicknell's Thrushes banded at two e. Maryland sites 18–31 May (B. Ross and J. Weske unpubl.). At Island Beach State Park, New Jersey, only 3 of 43 identified Bicknell's Thrushes banded 1964–1999 were captured during spring, 18–26 May (G. and E. Mahler, R. McKinney, R. Yunick unpubl.). At a Queen's Co. banding station in w. Long I., New York, species made up 24% of spring transients of Bicknell's/Gray-cheeked thrush complex (n = 24 Bicknell's, 76 Gray-cheeked) banded from 1932 to 1939; earliest date 11 May, latest 27 May (Beals and Nichols 1940). Farther east in Suffolk Co., Long I., Bicknell's Thrush comprised 24% of identified spring migrants (n = 4 Bicknell's, 17 Gray-cheeked) banded in 1959–1974, all on single date, 28 May 1967 (Lanyon et al. 1970, W. Lanyon unpubl.).
In New England, 5 verifiable (wing chord ≤93 mm) spring specimens in coastal Connecticut 15–27 May, 4 in e. Massachusetts 20 May–11 Jun, the latter record of an exceptionally late female (Wallace 1939). At a coastal banding site in se. Massachusetts, 18% of new captures of Bicknell's/Gray-cheeked thrush complex in 1966–1996 referable to Bicknell's (n = 17); earliest date 23 May, latest date 6 Jun, mean date 29 May ± 4.1 d SD [Manomet Observatory for Conservation Sciences (MOCS) unpubl.]. On Appledore I. off s. Maine coast, 4 captures of Bicknell's among 44 individuals of the species complex banded in 1983–1999, 18 May–1 Jun (S. Morris unpubl.). Earliest recorded occurrence on high-elevation breeding grounds in n.-central Vermont 16 May, well established in Green Mtns. by 25 May in most years (VCE). Reported to return to n. White Mtns. 25–30 May (Wallace 1939)."

Fall
"Birds with geolocators from across breeding range (Catskill Mountains to Gaspé Peninsula) departed breeding sites during first week of October (30 September – 12 October, n = 16; McFarland et al. In Prep). Mean duration of fall migration 29 ± 10 days with stopover duration ranging from 6 to 33 days during late October and early November; stopovers largely centered on western Caribbean, near final wintering grounds destinations (McFarland et al. In Prep). Migrants identified on basis of nocturnal flight calls passing over n. Gaspé Peninsula in late Sep 1948 (Ball 1952, Evans 1994e). Latest record on Mt. Mansfield, VT, 3 Oct; one presumed local hatch-year (HY) bird banded 29 Aug 1996 was recaptured 30 Sep (VCE). Six birds reported from Whiteface Mt., an Adirondacks breeding site, 26 Sep 1948 (Carleton 1999). Few reliable records from northern part of migratory range, as migrants appear to move rapidly southeastward. No confirmed Bicknell's among 21 "Gray-cheeked Thrushes" banded at a central Vermont site 1981–2000 (VCE). On the east slope of Adirondack Mtns. at 730 m elevation, individual HY Bicknell's banded on 9 Sep 1992 and 24 Sep 1994, respectively (W. Lanyon unpubl.). In Canadian Maritime Provinces, 1 of 7 "Gray-cheeked Thrushes" banded on Kent I., New Brunswick, was identified as Bicknell's by wing length, a HY bird on 5 Oct 1980 (J. Cherry and P. Cannell unpubl.). Similarly, at Atlantic Bird Observatory off sw. Nova Scotia, 1 of 7 individuals of the two species banded in 1996–1998 had a wing length consistent with Bicknell's, a HY bird on 14 Sep 1998 (T. Fitzgerald unpubl.). Two responded vigorously to playback on Massif du Sud, Quebec on 1 Oct 2009 (K. McFarland).

In New England, majority of fall records from coastal or near-coastal locations. Seven identified specimens from Massachusetts 26 Sep–16 Oct, 9 from Connecticut 21 Sep–12 Oct (Wallace 1939). On se. Massachusetts coast, 19 of 214 banded fall migrants (9%) of Bicknell's/Gray-cheeked thrush complex identifiable as Bicknell's by wing length; earliest date 22 Sep, latest 20 Oct, mean date 6 Oct ± 6.9 d SD (MOCS unpubl.)."

Literature:

Townsend, J. M., K. P. McFarland, C. C. Rimmer, W. G. Ellison, and J. E. Goetz (2015). Bicknell's Thrush (Catharus bicknelli), version 2.0. In The Birds of North America (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA.https://doi.org/10.2173/bna.592

Last researched by:	Petzinger
Date researched:	12/14/2018

Aves

Black Rail

Laterallus jamaicensis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4997	Breeding	Nest	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4998	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4999	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5000	Breeding	Breeding Sighting-Confirmed	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5001	Breeding	Foraging	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5002	Breeding	Roosting Area	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Black rail research from different locales around the country report similar home ranges for clapper rails. In Arizona, the average home range was 0.4 ha + 0.2 ha, with a range of 0.1 ha - 1.8 ha (Flores 1991). In Florida, the male average home range was 1.3 ha and the female was 0.62 ha (Legare and Eddleman 2001). In the lower Colorado River, a telemetry study revealed the average home range as 0.43 ha, with a core use area of 0.10 ha (NatureServe 2006). The only report that deviates from this range (0.1-0.43) is from Maryland, where the home range is suspected to lie between 3-4 ha (NatureServe 2006). The minimum inferred extent set by NatureServe is 0.1 km. ENSP will use the NatureServe minimum inferred extent of 0.1 km until such time as that is changed or we have additional information, including New Jersey-specific data, to justify a change in this value.

Literature:

Flores. 1991. Ecology of black rail in southwest Arizona. Final Report, US Bureau of Reclamation, Yuma Project Office and Arizona Department of Game and Fish. Yuma, AZ.

In Arizona, California black rails had an average home range of 0.4ha + 0.2 ha. Home ranges observed in the study ranged between 0.1-1.8 ha.

Legare. M.L., W.R. Eddleman. 2001. Home range size, nest site selection and nesting success of black rails in Florida. Journal of Field Ornithology 72 (1): 170-7.

A telemetry study in Florida revealed that males kept an average home range of 1.3 ha, while the

females averaged 0.62 ha.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

Personal comments by R. Flores set an average home range of 0.43 ha, with a significant core size of 0.10 ha based on a telemetry study in the Lower Colorado River. Personal comments by J.G. Weske estimate a 3-4 ha home range for bitterns in Maryland.
The inferred minimum extent of habitat use (when actual extent is unknown) is 0.1 km

Last researched by: Davis

Date researched: 7/1/2006

Aves

Black Skimmer
Rynchops niger

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4958	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4959	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4960	Breeding	Suspected Breeding Location	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
4961	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4962	Breeding	Foraging	9.6 km Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4963	Breeding	Nesting Colony	71.25 Meter Buffer	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes

Justification:

Black Skimmers nest in colonies and feed primarily in the salt marshes, estuaries, lagoons and tidal pools around their nest sites (Erwin 1977, Valiela 1984). There have not been exhaustive studies on the commuting distances for black skimmers, but at least two studies have been conducted. On Long Island, New York, black skimmers foraged < 8 km from the colony (Gochfeld and Burger 1994). In Georgia, they foraged approximately 5.2 km from the colony (Tomkins 1951).

Since there are so few studies focusing on black skimmers, commuting distances from related species are used to facilitate the establishment of a Landscape model. Least terns, who sometimes nest at the same sites as black skimmers, foraged an average of 3-12 km from nesting sites (Thompson, et al 1997). California gulls foraged an average of 17.4km with a maximum of 61 km (Baird 1977). Forster's terns had a reported feeding radius of 3.2 km from nesting colonies (VanRossem 1933).

Literature:

Baird, P.A. 1977. Feeding ecology of ring-billed and California gulls (Larus delawarensis and L. californicus). Pacific Seabird Bulletin 4:16-17.

California gulls foraged an average of 17.4 kilometers from colony and maximum foraging distances ranged from 32 to 61 kilometers. Ring-billed gulls foraged an average of 11 km from

colony.

Erwin, M. 1977. Foraging and breeding adaptations to different food regimes in three seabirds: the Common Tern (Sterna hirundo), Royal Tern (Sterna maxima), and Black Skimmer (Rynchops niger). Ecology 58: 389-397.

In Virginia, 88% of black skimmers fed in salt marsh tidal pools.

Gochfeld, M. and J. Burger. 1994. Black Skimmer (Rynchops niger). In The Birds of North America, No. 108 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists Union.

On Long Island, New York, main feeding areas were located < 8 km from colony. Colony sites were often located near inlets. This may reflect access to feeding areas as well as suitable substrate.

Thompson, B.C., J.A. Jackson, J. Burger, L.A. Hill, E.M. Kirsch and J.L. Atwood. 1997. Least Tern (Sterna antillarum). In The Birds of North America, No. 290 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Throughout their North American range, least terns foraged 3-12 kilometers from nesting colonies.

Tomkins, I.R. 1951. Method of feeding in the Black Skimmer, Rynchops nigra. Auk 68: 236-239.

In Georgia, black skimmers fed approximately 5.2 km from a colony.

Valiela, I. 1984. Marine ecological processes. Springer-Verlag, New York.

Black skimmers fed mainly in tidal waters of bays, estuaries, lagoons, rivers, and salt marsh pools, creeks, and ditches. These habitats concentrate small fish.

Van Rossem, A. J. 1933. Terns as destroyers of birds' eggs. Condor 35:49-51.

Forster's terns had a reported feeding radius of 3.2 kilometers.

Last researched by: Davis

Date researched: 2/1/2007

Aves

Black-billed Cuckoo

Coccyzus erythropthalmus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5211	Breeding	Breeding Sighting-Confirmed	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5213	Breeding	Breeding Sighting	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5214	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

There is little information about territory and home range sizes of Black-billed Cuckoos, but there is evidence that fledglings can travel between 150m and 2.1 km after leaving the nest, even when they cannot fly. Because little is known the more conservation fledgling distance of 150 meters was chosen for the breeding area occurrence.

Little is known about the stopover behaviors of Black-billed Cuckoos, so the default 71.25-meter buffer size was chosen.

Literature:

Hughes, J. M. (2020). Black-billed Cuckoo (Coccyzus erythropthalmus), 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

Breeding habitat includes groves of trees, forest edges, and thickets; frequently associated with water. In e. Canada and ne. U.S., usually found in edges and clearings of young deciduous and mixed deciduous-coniferous woods; abandoned farmland with trembling aspen, poplar, and birch. Will also use brushy hillsides and pastures, roadsides, and fencerows, orchards and berry patches, and hawthorn thickets. In wet areas, often among willows near edges of bogs and marshes, or on lake and river shores. Occasionally found in urban areas (parks, ravines, golf courses, residential gardens). May be susceptible to habitat fragmentation and modification. In Saskatchewan, abundance correlated with grove size ($p < 0.05$), and not found in aspen groves smaller than 1.2 ha. In central New Jersey, observed only on forest plots 7.5 and 24 ha in size; absent from plots ranging from 0.01 to 4 ha.

Migratory stopover habitat includes wooded areas and dense thickets during migration through Florida. In Texas, occurs in woodlands, particularly along streams and ponds, dense borders of meadows and margins of forests, also groves and thickets of coastal prairies. Also found near human habitation in orchards and gardens, but remains well hidden.

Little information about territoriality. Probably territorial, as is Yellow-billed Cuckoo. Black-billed cuckoo chicks cannot fly for 2 weeks after leaving the nest, but they travel considerable distances, with one fledgling captured 2.1 km away 2 weeks and one day after leaving the nest.

Sealy, S. G. (1985c). Erect posture of the young Black-billed Cuckoo: an adaptation for early mobility in a nomadic species. Auk 102:889-892.

Although the young cannot fly when they leave the nest, they nevertheless move considerable distances by climbing through the vegetation and jumping from branch to branch. Because they are surely vulnerable to predation under these circumstances, the erect posture is presumably adaptive, even after they can fly. The extent of movements by out-of-nest individuals is indicated by one young that left its nest in the ridge forest on 12 or 13 June and was mist-netted about 150 m from the nest on 2 July, and a second young that left its nest on about 16 June and was netted on 1 July, 2.1 km from the nest.

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Blackburnian Warbler
Setophaga fusca

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5217	Breeding	Breeding Sighting	60 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5218	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5219	Breeding	Breeding Sighting-Confirmed	60 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Very little literature about territory size exists on blackburnian warblers, so the breeding occurrence area was chosen based upon the largest mean territory size of 1.1 ha reported. Blackburnian warblers are not state listed during non-breeding, so it will not be included in the Landscape Project and the default buffer was chosen.

Literature:

Morse, D. H. (2004). Blackburnian Warbler (Dendroica fusca). The Birds of North America Online. (A. Poole, Ed.) Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Blackburnian_Warbler/.

Breeding individuals occur in coniferous and mixed coniferous-deciduous forests, especially mature forest, but mainly inhabits deciduous forest at southern end of range. Elsewhere in range may inhabit primarily deciduous forests at low densities. In NY, found mostly in forest with hemlocks; even in forests with few hemlocks, almost invariably associated with these isolated trees. In New York State and other areas with deep coniferous forests and swamp woods at higher elevations, often prefers spruce draped with Usnea lichen. Along the Maine coast, inhabits red and white spruce forests, but not on small islands (< 1 ha), which generally have insufficient tall vegetation to support them. In Minnesota, found on islands of < 1 ha only if tall white pines or black spruces are available. Can nest on islands in New York lakes comparable in size to Maine islands, but characterized by coniferous vegetation averaging 4 m higher than in Maine. In Saskatchewan, common in white spruce forests, but absent in black spruce and jack pine. In Ontario, mostly in moist to dry hemlock forests, but also other types of conifer-dominated woodlands (white pine, cedar, spruce), and some hardwoods, especially those historically dominated by American chestnut; in southern regions of the province, has adapted to mature conifer plantations. In Quebec, most common in mixed forest with mature balsam fir stands; nesting and feeding individuals seek tall balsam spires, towering over rest of the canopy; highest relative abundance in sugar maple/yellow birch/balsam fir forests; Has disappeared from some hemlock forests of Highlands Plateau, North Carolina over the past 50 years.

Breeding territories all-purpose, and both males and females spend most of time on them. Territory size varies with habitat: smaller where favored conifers dense than in mixed coniferous-deciduous forests where primarily exploit conifers. Along Maine coast, territories between 0.4 and 0.6 ha in both red and white spruce. Territories averaged 1.1 ha in a largely deciduous forest with occasional, patchily distributed conifers, apparently in response to distribution of favored coniferous growth. Territories in fir-spruce forest in Ontario from 0.8-0.9 ha.

Last researched by: Petzinger

Date researched: 9/30/2008

Aves

Black-crowned Night-heron
Nycticorax nycticorax

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4984	Breeding	Nesting Colony	71.25 Meter Buffer	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes
4985	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
4986	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4987	Breeding	Foraging	6 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4988	Breeding	Roosting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4989	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Nesting area is defined by the area the herons actually use, as these birds do not defend a territory except immediately around their individual nests. The boundaries of the colony are defined as much by social attraction phenomenon and by habitat suitability. Consequently there is now immediately apparent justification for buffering the mapped extent of a nesting area. Where the mapped extent of a colony was available it was used. Where the mapped extent was not available the default seconds precision circle was used around the recorded nesting location point.

ENSP reviewed the literature regarding commuting distance for colonial nesting long-legged wading birds which fairly consistently indicates that the importance of suitable foraging habitat decreases with the distance from the nesting area (e.g. Dowd and Flake 1985, Custer et al. 2004, Kelly et al 1993, Thompson 1978). This is not surprising considering the energy demands of long commutes and the fact that, all other things being equal, if suitable foraging habitat is randomly distributed within the possible foraging range, simple geometry would argue that availability would increase with the square of the distance from the colony. Consequently, a particular type of wetland or riparian habitat is more critical if it is located close to a nesting area than a similar area located near the edge of the energetically feasible foraging range from the colony. It would therefore be unjustifiable to use the maximum foraging distance figures to define all potential foraging habitat as critical foraging habitat for a particular nesting colony. Conversely, using an average foraging

distance figure may under-include suitable habitat by omitting some foraging areas that are important because they provide particularly rich and easily exploited feeding habitat. Further, research (Custer et al. 2004) indicates that longer commuting distances are more frequent during high-demand and demographically critical nestling rearing period. Where the literature on commuting distance includes several studies, there can be wide variability in the mean commuting distances between different studies. When such was the case, we either averaged the reported mean commuting distances or used the information from the study with a large sample size or from an area most ecologically similar to New Jersey. We then doubled this figure.

Black-crowned night heron foraging flight distances in South China differed between high and low tides. At high tide, the average flight was 0.47 km, with a range of 0.03-1.10 km. At low tide, the average flight was 0.57 km, with a range of .03-1.38 km (Wong 1999). The Birds of North America, however, cites foraging flights of up to 24 km (Davis 1993). NatureServe sets a minimum inferred extent of 3 km for black-crowned night herons (NatureServe 2006). Since there is very little information available for this species, we apply a conservative 9.6 km radius occurrence area to nesting colony foraging areas.

Literature:

Custer, C.M., S.A. Suarez, D.A. Olsen. 2004. Feeding habitat characteristics of the Great Blue Heron and Great Egret nesting along the Upper Mississippi River, 1995-1998. Waterbirds 27(4): 454-68.

The majority of the herons in this study fed <5 km from the nesting site, and avoided areas > 10 km away. They flew farther to sites during the brood-rearing period than during incubation. Only 10% of the feeding flights ended at a location where another heron was present, indicating that they prefer to feed alone.

Davis, W.E.Jr. 1993. Black-crowned night heron (Nycticorax nycticorax) In The Birds of North America No. 74 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Foraging commuting distance can be up to 24 km.

Dowd and Flake. 1985. Foraging habits and movements of nesting Great Blue Heron in prairie river ecosystem, South Dakota. Journal of Field ornithology 56: 377-87.

A study in South Dakota found that the average distance that great blues flew from their colony to a foraging site was 3.1 km, and the maximum observed distance was 24.4 km. Eighty-five percent of the herons in the study fed within 4 km of the colony.

Kelly J. P., H. M. Pratt, P. L. Greene. 1993. The distribution, reproductive success, and habitat characteristics of heron and egret breeding colonies in the San Francisco Bay area. Colonial Waterbirds. 16:18–27.

> 95% of great blue herons and >90% great egrets fed within 20 km of their colony.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

The inferred minimum extent of habitat use (when the actual extent is unknown) in 3 km. This is based on a low mean foraging range size.

Thompson. 1978. Feeding areas of Great Blue Herons and Great Egrets nesting in the floodplain of the upper Mississippi River. Proc. Colonial Waterbird Group. 2: 202-13.

In central Minnesota the average distance that the herons flew from the colony to a foraging area was 6.5 km, and the maximum observed was 20.4 km. Fifty-three percent of the herons in the study fed within 4 km of the colony.

Wong. 1999. Foraging flights of nesting egrets and herons at Hong Kong Egretry, South China. Waterbirds 22(3): 424-434.

In South China, foraging flight distances differed between high and low tides. At high tide, the average flight was 0.47 km, with a range of 0.03-1.10 km. At low tide, the average flight was 0.57 km, with a range of .03-1.38 km.

Last researched by: Davis

Date researched: 7/1/2006

Aves

Black-throated Blue Warbler
Setophaga caerulescens

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5224	Breeding	Breeding Sighting	250 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5225	Breeding	Breeding Sighting-Confirmed	250 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5227	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 1 - 4 ha and young can move 200-300 meters from the nest within 2 weeks of fledging. Based upon the upper limit territory size and to incorporate post-fledging habitat, an occurrence area of 250 meters was chosen. Black-throated blue warblers are not state listed during non-breeding, so it will not be included in the Landscape Project and the default buffer was chosen.

Literature:

Holmes, R.T., N. L. Rodenhouse and T. S. Sillett. (2005). Black-throated Blue Warbler (Dendroica caerulescens). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Black-throated_Blue_Warbler/

Breeds mainly in large, continuous tracts of undisturbed deciduous or mixed deciduous/coniferous forests usually dominated by maples, birches, beech, and other northern hardwoods, with varying amounts of eastern hemlock, spruce, and fir. It can sometimes also be found, especially during the fledgling period, in dense patches of regenerating aspen, spruce, or in red pine plantations with a dense, deciduous sapling understory. Forests most suitable as breeding habitat contain a relatively thick undergrowth of dense, usually deciduous or broad-leaved evergreen shrubs. The species occurs where there is thick undergrowth of mountain laurel, rhododendron, creeping yew, deciduous bushes, small saplings, or tiny conifers. Where shade-tolerant understory shrub species are typically rare, or have been removed by white-tailed deer, this species tends to respond positively to low-intensity harvest (e.g., selection cutting) of closed-canopy forest, which opens the forest canopy and promotes dense patches of seedlings and saplings. Selection of habitats with a dense shrub layer seems most closely related to nesting requirements and not to foraging needs or other factors. Does not usually occur commonly in young clear-cuts or second growth, but becomes frequent once canopy becomes well developed and gaps allow the development of shrubs, usually > 50 yr following clear-cutting. Appears to be about equally common in both managed and unmanaged northern hardwoods forests. Densities not significantly affected by selective logging activities as long as there is a dense or patchily dense shrub layer and relatively complete canopy cover.

Territory size ranges from about 1 to 4 ha, depending on habitat, being smallest where the shrub layer is dense and heterogeneous. Young can move 200-300 meters from nest during the 1st 2 weeks after fledging.

Last researched by: Petzinger

Date researched: 9/30/2008

Aves

Black-throated Green Warbler

Setophaga virens

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5229	Breeding	Breeding Sighting	50 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5230	Breeding	Breeding Sighting-Confirmed	50 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5233	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Little is known about the territory size of BTNW, but it does depend on the type of habitat. Because the favored spruce habitat is not common in New Jersey, the territory size will likely be larger than territories in favored habitat (0.25 ha). Thus, the upper range of listed territory sizes was chosen to create the breeding occurrence area. Non-breeding black-throated green warblers are listed as stable in New Jersey so no occurrence area was specified.

Literature:

Morse, D. H. and A. F. Poole (2005). Black-throated Green Warbler (Dendroica virens). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Laboratory of Ornithology.

Habitat consists of boreal coniferous forests and transition areas between coniferous and deciduous forests - prefers coniferous forests but can inhabit mixed and deciduous forests, often associated with hemlock forests.

Little data on territory size. Territory size depends on habitat - smaller territories occur in favored habitat of coniferous forest compared to less favored mixed forests. Smallest territory in favored habitat is 0.25 ha. Ontario territories ranged from 0.3 - 0.9 ha.

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Blue-winged Warbler
Vermivora cyanoptera

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5254	Breeding	Breeding Sighting-Confirmed	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5256	Breeding	Breeding Sighting	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5257	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Based on the territory upper limit of 4 ha and travel 100 m beyond territories, a 200 m buffer will be used as the radius.

"Short flights from branch to branch during breeding season; generally confined to occupied territories. Long flights of >100 m occasionally follow territorial disputes. Territory size in ne. Ohio (Cuyahoga Co.) averaged 1.1 ha (range 0.3-5.0 ha, n = 34; Canterbury et al. 1995b); larger in years of low density (Canterbury et al. 1996). Territorial boundaries align with edge or row of tall trees and are reinforced by interactions with neighboring males.

Usually nests in early- to midsuccession habitat (Berger 1958, Confer and Knapp 1981, Will 1986, Bucklew and Hall 1994). Patches of dense, herbaceous growth as well as of shrubs and some forest cover observed in all of 50+ Blue-wing territories measured throughout New York State (JLC). Most habitat descriptions refer to use of saplings or forest edge or forest clearings and dense shrub or dense thickets. In Connecticut, prefers clearcuts with dense shrub cover (0.5–1.5 m high), canopy height <7 m, and close to roads or power line rights of way; not sensitive to size of clearcut (Zuckenberg 1998, R. Askins in litt.). Vegetation on territories in 2 studies (central New York State [Confer and Knapp 1981], n.-central New York State [JLC]) comprised mosaic of dense growth of herbs (10%, 21% respectively), shrubs (15%, 25%), and trees (i.e., woody stems >5 m; 33%, 23%). In W. Virginia, proportion of territories covered by dense herbs was higher than in New York State (33%), while proportion covered by dense trees was lower (about 10%; RAC). This mix of vegetation occurs at edges of wetlands and damp areas or dry, upland habitat, independent of presence or absence of water. In s.-central West Virginia, unmated male Blue-wings defend territories in wetter habitat than mated males (RAC and D. M. Stover unpubl.)."

Literature:

Gill, F. B., R. A. Canterbury, and J. L. Confer (2001). Blue-winged Warbler (Vermivora cyanoptera), version 2.0. In The Birds of North America (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.584

Last researched by: Petzinger

Date researched: 12/24/2018

Aves

Bobolink
Dolichonyx oryzivorus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4757	Breeding	Breeding Sighting-Confirmed	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4759	Breeding	Breeding Sighting	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4761	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 0.45 – 2.5 ha (Dechant et al. 1999, Martin and Gavin 1995), but the closest study in NY had average territories of 0.5 ha (Dechant et al. 1999). The breeding occurrence area was chosen based upon the NY average of 0.5 ha and increased because the home range size encompasses several territories and the increase of home range due to movement of post-fledging chicks (Martin and Gavin 1995). Little is known about migratory stopover habitat use so the migrant occurrence area chosen is the default.

Literature:

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, A. L. Zimmerman, and B. R. Euliss. 1999 (revised 2001). Effects of management practice on grassland birds: Bobolink. Northern Prairie Wildlife Research Center, Jamestown, ND. 24 pages.

Territories did not vary much with location. Wisconsin mixed hayland floodplain territories ranged from 0.45 - 0.69 ha where dry pasture territories were 2.5 ha, New York hayfields contained territories of 0.5 ha, tame hayfields in Michigan had territories of 1.4 ha. Illinois minimum area for tallgrass prairie was 10-30 ha. Nebraska minimum area for wet meadows was 46 ha and perimeter-area ratio of 0.010.

Martin, S. G. and T. A. Gavin. 1995. Bobolink (Dolichonyx oryziorus. In The Birds of North America, No. 176 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Territories vary according to the density of bobolinks and type of habitat. In Wisconsin territories ranged from 0.7 - 2 ha. Mean territory size in New York was 0.49 ha, Oregon was 0.74 - 1.45 ha. Courtship occurs within 40 m of nest. Gathering nesting materials occurs within 80 m of nest. Fledglings can move up to 70 m the first day out of nest.
During breeding season, home ranges of males and females encompass area of several male territories (TAG), an area of use that becomes larger when nestlings fledge.

Mixed-sex and -age flocks begin forming in late June. In some locations flocks leave nesting hay fields and meadows by late July; in others, flocks remain until mid-Aug. Birds then seek shelter of freshwater marshes and coastal areas to complete Prebasic molt before migration. This species has not been studied intensively outside the breeding season, habitat use during Aug-Sep is probably the least-known period of its annual cycle

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Mitchell, L. R., C. R. Smith and R. A. Malecki, R. A. 2000. Ecology of grassland breeding birds in the northeastern US - a literature review with recommendations for management. USGS, BRD, NY Cooperative Fish and Wildlife Research Unit, DNR, Cornell University, Ithaca, NY 14853-3011. September 2000.

Maine had 40% incidence at 500 ha, but not in optimal habitat for bobolink (see Vickery et al. below). New York’s minimum area was 16 ha with a mean of 56.6 ha. Another study in NY had 96% incidence at 10-20 ha, 68% incidence at 5-10 ha, and 18% incidence at 3-6 ha. Illinois had 50% incidence at 50 ha and a minimum area of 10-30 ha.

Vickery, P. D., M. L. Hunter, Jr. and S. M. Melvin. 1994. Effects of habitat area on the distribution of grassland birds in Maine. Conservation Biology 8(4): 1087-1097.

Bobolinks have positive area effects but had low incidence because sites did not have enough graminoid cover to be a preferred site.

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Broad-winged Hawk
Buteo platypterus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5264	Breeding	Nest	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5265	Breeding	Breeding Sighting	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5267	Nonbreeding	Non-breeding Sighting	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

This species has small breeding territories but are area sensitive. The buffer was chosen based on breeding territory size and increased for the species' mobility and need for large patches. Until more is discovered about the mobility of the species, a 100 meter radius buffer will be used.

Literature:

Goodrich, L. J., S. C. Crocoll, and S. E. Senner. 1996. Broad-winged Hawk (Buteo platypterus). In The Birds of North America, No. 218 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

N/A

Last researched by: Clark

Date researched: 2/1/2007

Aves

Brown Thrasher
Toxostoma rufum

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5275	Breeding	Breeding Sighting	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5277	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5278	Breeding	Breeding Sighting-Confirmed	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 0.5 - 1.13 ha, but fledglings can move a median 200 meters (up to 800 meters) from the nest within a few weeks of fledgling. Therefore, the breeding occurrence area was chosen to incorporate a territory and the median post-fledging habitat. Non-breeding individuals are listed as stable in NJ so the default occurrence area was chosen and will not be included in the Landscape Project.

Literature:

Cavitt, J. F., and C. A. Haas. 2000. Brown Thrasher (Toxostoma rufum). In The Birds of North America, No. 557 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Breeds in dry, open country along coastal plain of Long I., NY, especially in thickets and scrubby fields; in w. New York, prefers brushy hillsides covered with hawthorn. In New Jersey pine barrens, breeds at high densities in regularly burned habitat dominated by pitch pine and scrub oaks and black jack oak but absent or rare in areas where fire suppression allows canopy oaks or white oaks. Not found breeding in New Jersey woodlots <0.8 ha in size and rare in woodlots of <4 ha. In Georgia, found in thickets and underbrush at edge of cotton fields in the Piedmont and Okefenokee Swamp. Only occasionally breeds in urban settings, including yards, gardens, and fencerows. Although uses a wide variety of habitats, reaches highest densities in shrub or midsuccessional stages of forests. Habitat suitability index model included 3 variables; suitability peaked when density of woody stems ≥1.0 m tall was 10,000-30,000/ha, percentage of canopy cover of trees was 10-30%, and percentage of ground surface covered by litter ≥1 cm deep was >80%. Breeding-territory size varied from 0.5 to >1.0 ha even within limited area, probably depending on habitat quality; in some cases, pairs nested within 15 m of each other. In IL, average breeding territory size varied from 0.65 to 1.13 ha over a 3-yr period. Most activities (including construction of up to 4 nests) of a pair seem to be confined to territories. In N. Dakota, young moved a median distance of only 200 m from nest in 6 wk. One fledgling moved 0.8 km within 12 d.

During migration, observed in hedgerows and railroad rights-of-way during fall migration in Illinois. Occasionally observed in chaparral in San Patricio Co., TX, during migration, but did not defend winter territories in this habitat. Found in mature deciduous forests, urban gardens, yards, and parks, particularly those with fruit-bearing plants and feeders.

During the winter, abundant in riparian woodlands and absent from chaparral in San Patricio Co., TX. Foraged at sites with well-developed overstories and only rarely in open areas without canopy cover. Occurs in thickets and brushy woodland edges, often in yaupon holly thickets, in Texas in both winter and summer. Also frequents fencerows, gardens, yards, and cultivated areas. Occurs in riparian forest, oak woodland, and mesquite chaparral within Texas Coastal Bend. In Mississippi, found within vine-covered thickets, brier patches, and hedgerows. In Illinois, typically found in sheltered areas with heavy brush and often near feeders. Maintains winter territories in Texas by chasing and calling. Returns to same winter territory from one year to next.

Last researched by: Petzinger

Date researched: 9/30/2008

Aves

Canada Warbler
Cardellina canadensis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5281	Breeding	Breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5283	Breeding	Breeding Sighting-Confirmed	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5284	Nonbreeding	Non-breeding Sighting	160 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories average between 0.69 and 1.5 ha (Reitsma et al. 2020), and it was noted that a 100-m buffer from the wetland edge is adequate for a Canada warbler territory (Lambert and Faccio 2005). While not much is known about home range sizes of Canada Warblers, they can be 3-4x larger than nesting territories. It was also noted that Canada warblers feed young fledglings 60 - 90m away, but that post-fledging distance is variable, with one fledgling located 370 m from the territory < 1 week after fledging (Reitsma et al. 2020). Based on all the information, a 300-meter buffer was chosen for breeding Canada Warblers to better represent home ranges and post-fledging habitat needs.

During the non-breeding season, Canada Warblers forage in mixed species flocks led by Tufted Titmice and are likely territorial to other Canada Warblers while foraging. Non-breeding territories of Tufted Titmouse flocks averaged between 5.4 and 8 ha (Ritchison et al. 2020) so a 160-meter buffer size was chosen based on the radius of the 8-ha average territory size of non-breeding Tufted Titmice.

Literature:

Lambert, D. J. and S. D. Faccio. 2005. Canada warbler population status, habitat use, and stewardship guidelines for northeastern forests. Vermont Institute of Natural Science, Woodstock, VT.

Inhabits lowland and upland habitats, including swamps, streamside thickets, brushy ravines, moist forests, and regenerating timber cuts with well-developed shrub layer and structurally complex forest floor. They are area sensitive in "settled" areas but not in forest-dominated regions. In Rhode Island, the greatest incidence occurred in swamps > 6 ha and where forest covered 50% of landscape within 2km. "A 100-m distance from shoreline or wetland edge is adequate to encompass a typical Canada warbler territory."

Reitsma, L. R., M. T. Hallworth, M. McMahon, and C. J. Conway (2020). Canada Warbler (Cardellina canadensis), version 2.0. In Birds of the World (P. G. Rodewald and B. K. Keeney, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.canwar.02

Wide range of deciduous and coniferous forests. Most abundant in moist, mixed coniferous-deciduous forests with a well-developed understory. Often near open water. At lower elevations, often restricted to cool, wet, low-lying areas: cedar (Cupressaceae) woods, swampy forests, sphagnum (Sphagnum spp.) bogs, moist forest clearings and woodland edges, spruce (Picea spp.) tamarack (Larix laricina) bogs, aspen (Populus spp.) and moist spruce-birch (Betula spp.) forests, and alder (Alnus rugosa) and willow (Salix spp.) stands along stream banks. Less common in shrub wetlands.

Males may defend an area larger than the area in which they sing (e.g., the singing area for a male in New York was 0.24 ha, but after nesting began he ranged over a 0.8 ha-it is these larger areas that are apparently defended as territories against intruders [176]).

In New Hampshire, 16 years of continuous territory mapping documented mean territory sizes of older males ranging from 0.67-1.16 ha and for younger males from 1.16-1a. Territory sizes depended upon predominant habitat type. Four year averages were 0.88 ha for red maple (Acer rubrum) swamp compared to 1.5 ha for predominantly early-mid succession mixed forest, but neither age class or habitat type affected ability to fledge young - suggesting behavior can adequately compensate for habitat and differences in age-related experience (98, 104, 198). In Ontario, average territory size 0.2 ha in Algonquin Provincial Park (200); 1 territory in Quebec 0.4 ha (A. Cyr in 155). Two paired males apparently defended areas of 0.8 and 1.2 ha in New York (176).

Two pairs feeding newly fledged young just out of nest only 60-90 m apart. Three pairs nesting <30 m away from each other along stream in West Virginia and 5 nests found along 46 m of stream in Vermont (Cornell Nest Records Program [CNRP]). Parents still on territory feeding fledged young 1 wk after fledging in Minnesota (185). Duration of feeding varies, as does distance of dispersal from nest among fledglings. One fledgling in New Hampshire was found 370 m from male parent's territory only 6 d after fledging; another stayed within 50 m of nest site for at least 12-18 d (M. Goodnow et al., unpublished data). Fully self-reliant within 2 wk of fledging.

Ritchison, G., T. C. Grubb Jr., and V. V. Pravosudov (2020). Tufted Titmouse (Baeolophus bicolor), 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.tuftit.01

Non-breeding territories of Tufted Titmouse flocks averaged between 5.4 and 8 ha.

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Caspian Tern

Hydroprogne caspia

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5292	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5293	Breeding	Foraging	6.5 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5294	Breeding	Nesting Colony	50 meter radii around nest/colony	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes
5295	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5296	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
5297	Breeding	Suspected Breeding Location	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No

Justification:

In New Jersey, Caspian terns nest primarily in the coastal salt marshes, building nests on wrack mats (Cuthbert and Wires 1999). They are primarily piscivores and relay on water bodies (bays, estuaries and ocean) as their foraging habitat (Cuthbert and Wires 1999). Distances commuted for foraging flights are not well understood, but there is some data to draw from and it is likely they participate in long foraging flights. In northern Lake Michigan, individuals (that were marked) were observed up to 50 km from their breeding colony (Cuthbert and Wires 1999). On the Pacific coast, adults were observed up to 62 km from their breeding colony (Gill 1976). Fifty (50%) of adults at a colony located on the Columbia River foraged within 8 km of their breeding site and 90% foraged within 21 km (Collis, et al 1999). Adults fitted with transmitters were documented foraging a minimum of 2.5 km offshore (Sirdevan and Quinn 1977). Another study on the Columbia River, in Oregon, found that radio tagged birds foraged, on average, between 14-29 km from the colony (Anderson et al. 2007). A third study on the Columbia River found that radio tagged terns foraged, a median of 7.7 km - 16.9km (depending on colony and timing of breeding cycle) (Lyons et al. 2005). NatureServe does not make any recommendations for inferred extents, but does recommend a 5km separation distance between breeding colonies. Since there are no New Jersey specific studies for this species (which breeds in small numbers in the state), we took into consideration studies for other locales and applied a 6.5 mile radius around the colony to protect likely foraging habitat.

Literature:

Anderson, S.K., D.D. Roby, D.E. Lyons, K. Collis. 2007. Relationship of Caspian tern foraging ecology to nesting success in the Columbia River estuary, Oregon, USA. Estuarine, Coastal and Shelf Science 73: 447-456.

This study reports the same results as the 2005 study (see Lyons, et al. below) but makes focuses on the idea that there are differences in commuting distances not just between discrete colonies but also among each colony on a yearly basis. For example, on East Sand Island, adults foraged during the chick rearing season an average of 20.2 km from the colony in 2000 (n=19) but only 13. 9 km in 2001 (n= 33). They hypothesize that these differences were likely the result of site conditions (such a drought) and availability of prey items.

Collis, K., S. Adamany, D. D. Roby, D. P. Craig, and D. E. Lyons. 1999. Avian predation on juvenile salmonids on the lower Columbia River. 1998 draft annual report submitted to Bonneville Power Administration and U.S. Army Corps of Engineers. Second Version, October 1999.

Fifty (50%) of adults at a colony located on the Columbia River foraged within 8 km of their breeding site and 90% foraged within 21 km, showing a great variety in the distances traveled by this species to forage.

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 31 March 2011 from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/403doi:10.2173/bna.403

The BNA account gives information on all aspects of the natural life history of these species including locations of nesting and foraging habitat. The lead author also reported in a study she was incvolved with in Lake Michigan where marked birds were observed foraging up to 50 km from their breeding colony.

Gill Jr., R.E. 1976. Notes on the foraging of nesting Caspian Terns Hydroprogne caspia (Pallas). California Fish and Game 62: 155.

The author observed Caspian terns on the Pacific coast foraging up to 62 km from their breeding colony.

Lyons D.E., D.D. Roby, K. Collis. 2005. Foraging Ecology of Caspian Terns in the Columbia River Estuary, USA. Waterbirds 28(3): 280-291.

Two islands (Rice Island and East Sand Island) hosting Caspian tern colonies were studied to determine how foraging patterns affect nest success. The researchers found difference in foraging commute by colony and by timing during breeding cycle. Rice Island adults traveled a median of 12.3 km during early chick rearing and 16.9 km during late chick rearing while East Sand Island adults traveled 9.6 km during early chick rearing and 7.7 km during late chick rearing. This lead the authors to conclude that foraging distances are at least partially based on available habitat proximate to the colony.

NatureServe. 2010. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 31, 2011).

NatureServe recommends a 5 km separation distance from breeding occurrences. In its justification, it notes that this is certainly not large enough to compensate for the distances that foraging birds are likely to travel and that this number should be used for colony separations only. They chose this number to try and strike a balance between the high mobility of these birds and the practical considerations of conservation and management.

Sirdevan, J. E. and J. S. Quinn. 1997. Foraging patterns of Caspian Terns determined using radio-telemetry. Waterbirds 20: 429-435.

This study took place in two Lake Ontario colonies, Hamilton Harbor and Gull Island, and showed that the birds exhibit a great variety and unpredictability in foraging patterns.

Last researched by: Davis

Date researched: 3/31/2011

Aves

Cattle Egret
Bubulcus ibis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5298	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5299	Breeding	Nesting Colony	90 meter radii around colony	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes
5300	Breeding	Roosting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5301	Breeding	Foraging	7.0 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5302	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
5303	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Nesting area is defined by the area the birds actually use, as these birds do not defend a territory except immediately around their individual nests. The boundaries of the colony are defined as much by social attraction phenomenon and by habitat suitability. Consequently there is now immediately apparent justification for buffering the mapped extent of a nesting area. Where the mapped extent of a colony was available it was used.

ENSP reviewed the literature regarding commuting distance for colonial nesting long-legged wading birds which fairly consistently indicates that the importance of suitable foraging habitat decreases with the distance from the nesting area (e.g. Dowd and Flake 1985, Custer et al. 2004, Kelly et al 1993, Thompson 1978). This is not surprising considering the energy demands of long commutes and the fact that, all other things being equal, if suitable foraging habitat is randomly distributed within the possible foraging range, simple geometry would argue that availability would increase with the square of the distance from the colony. Consequently, a particular type of wetland or riparian habitat is more critical if it is located close to a nesting area than a similar area located near the edge of the energetically feasible foraging range from the colony. It would therefore be unjustifiable to use the maximum foraging distance figures to define all potential foraging habitat as critical foraging habitat for a particular nesting colony. Conversely, using an average foraging distance figure may under-include suitable habitat by omitting some foraging areas that are important because they provide particularly rich and easily exploited feeding habitat. Further, research (Custer et al. 2004) indicates that longer commuting distances are more frequent during high-demand and demographically critical nestling rearing period. Where the literature on commuting distance includes several studies, there can be wide variability in the mean commuting distances between different studies. When such was the case, we either averaged the reported mean commuting distances or used the information from the study with a large sample size or from an area most ecologically similar to New Jersey. We then doubled this figure.

This species is has a wider range of diet items than other herons and egrets nesting in New Jersey. Along with small fish, they will also eat grasshoppers, crickets, spiders, flies, frogs, noctuid moths and small mammals (Telfair 2006). Therefore when looking at the areas to be valued by this model, special attention should be paid to the marsh islands or inland areas that lie within the radius of the nesting colony, as well as the open water that other egret models value.

The worldwide range of this species is quite expansive, including parts of all continents except Antarctica (Telfair 2006). Due to this, there have been many studies conducted on this species and reported commuting distances are wide ranging. In North Carolina, cattle egrets traveled from 4-6 km to foraging sites from their nesting colonies (Custer and Osborn 1978). In Barbados, cattle egrets were observed foraging up to 5.7 km from breeding colonies (Krebs et al 1994). In southeastern Australia, 60% of cattle egrets fed within 6.5 km of the breeding colony (Richardson and Taylor 2003). In central Minnesota the average distance that the herons flew from the colony to a foraging area was 6.5 km (maximum distance 20.4 km) and 53% of the herons in the study fed within 4 km of the colony (Thompson 1978). In Texas, foraging flights ranged from 4-25 km, with 67% of those flights from 10-15 km (Mora and Miller 1998). In Baja, California, cattle egrets flew 2.5 - 35 km to foraging sites, most (80%) within 15 km of the breeding colony and 46% from 10-12.5 km (Mora 1997). In Alabama, cattle egrets traveled from 26-32 km from their breeding colonies to foraging sites (Bateman 1970). The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 3 km which is based on a low mean foraging range size for this group (NatureServe 2007).

Literature:

Bateman, D.L. 1970. Movement-behavior in three species of colonial nesting wading birds: a radio-telemetric study. Ph.D. dissertation, Auburn University, Auburn, AL.

In Alabama, cattle egrets traveled from 26-32 km from their breeding colonies to foraging sites.

Custer, C.M., S.A. Suarez, D.A. Olsen. 2004. Feeding habitat characteristics of the Great Blue Heron and Great Egret nesting along the Upper Mississippi River, 1995-1998. Waterbirds 27(4): 454-68.

The majority of the herons in this study fed <5 km from the nesting site, and avoided areas > 10 km away. They flew farther to sites during the brood-rearing period than during incubation. Only 10% of the feeding flights ended at a location where another heron was present, indicating that they prefer to feed alone.

Custer, T.W., R. G. Osborn. 1978. Feeding habitat use by colonially-breeding herons, egrets, and ibises in North Carolina. Auk 95: 733-743.

In North Carolina, cattle egrets traveled from 4-6 km to foraging sites from their nesting colonies.

Dowd and Flake. 1985. Foraging habits and movements of nesting Great Blue Heron in prairie river ecosystem, South Dakota. Journal of Field ornithology 56: 377-87.

A study in South Dakota found that the average distance that great blues flew from their colony to a foraging site was 3.1 km, and the maximum observed distance was 24.4 km. Eighty-five percent of the herons in the study fed within 4 km of the colony.

Kelly J. P., H. M. Pratt, P. L. Greene. 1993. The distribution, reproductive success, and habitat characteristics of heron and egret breeding colonies in the San Francisco Bay area. Colonial Waterbirds. 16:18-27.

> 95% of great blue herons and >90% great egrets fed within 20 km of their colony.

Krebs, E.A., D. Riven-Ramsey, W. Hunte 1994. The colonization of Barbados by Cattle Egrets (Bubulcus ibis) 1956-1990. Colon. Waterbirds 17: 86-90.

In Barbados, cattle egrets were observed foraging up to 5.7 km from breeding colonies.

Mora, M.A. 1997. Feeding flights of Cattle Egrets nesting in an agricultural ecosystem. Southwest Naturalist 42: 52-58.

In Baja, California, cattle egrets flew 2.5 - 35 km to foraging sites, most (80%) within 15 km of the breeding colony. Forty-six percent flew from 10-12.5 km.

Mora, M.A., J. M. Miller 1998. Foraging flights, reproductive success and organochlorine contaminants in Cattle Egrets nesting in a residential area in Bryan, Texas. Texas Journal of Science 50: 205-214.

In Texas, foraging flights ranged from 4-25 km, with 67% of those flights falling from 10-15 km.

NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: August 2, 2007).

The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 3 km. For the breeding season, this figure is based on a low mean foraging range size for this group.

Richardson, A.J., I. R. Taylor 2003. Are rice fields in southeastern Australia an adequate substitute for natural wetlands as foraging areas for egrets? Waterbirds 26: 353-363.

In southeastern Australia, 60% of cattle egrets fed within 6.5 km of the breeding colony.

Telfair, R. C. II. 2006. Cattle Egret (Bubulcus ibis). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Cattle_Egret/.

This species is has a larger range of diet items than other herons and egrets nesting in New Jersey. Along with small fish, they will also eat grasshoppers, crickets, spiders, flies, frogs, noctuid moths, and some small mammals.

Thompson. 1978. Feeding areas of Great Blue Herons and Great Egrets nesting in the floodplain of the upper Mississippi River. Proc. Colonial Waterbird Group. 2: 202-13.

In central Minnesota the average distance that the herons flew from the colony to a foraging area was 6.5 km, and the maximum observed was 20.4 km. Fifty-three percent of the herons in the study fed within 4 km of the colony.

Last researched by: Davis

Date researched: 1/1/2007

Aves

Cerulean Warbler
Setophaga cerulea

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5304	Breeding	Breeding Sighting-Confirmed	400 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5306	Breeding	Breeding Sighting	400 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5307	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Little information is available on home ranges of Cerulean Warblers, though it appears that males travel up to 150 m from the nest while defending it (Raybuck et al. 2020). After chicks fledge the nest, however, adults will care for fledglings outside of these territories, up to 1.4km (average 305-383m) from the nest 2 weeks after fledgling (Delancey and Islam 2019, Raybuck et al. 2020). Therefore, the breeding occurrence area will receive a 400-m buffer based on the upper limit of the average distance fledglings travel 2 weeks after leaving the nest.

Little is known about the non-breeding territories/home ranges, but there is some evidence that non-breeding individuals may be territorial against other Cerulean Warblers (Buehler et al. 2020). Therefore, the default buffer size of 71.25m was chosen.

Literature:

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

Territory size varies regionally and is likely contingent on breeding density as well as field and estimation techniques. Minimum convex polygons (MCP) are reported here for ease of comparison. In West Virginia, territory size was 0.31 ± 0.07 ha (burst sampling, range = 0.06-1.46 ha, n = 30; Perkins 2006); in Missouri, size was 0.9 ± 0.1 ha (presumed MCP, hybrid mapping method, range unknown; Robbins et al. 2009); in Ontario, 1.04 ± 0.1 ha (presumed MCP, playback method, range = 0.38-2.40 ha, n = 18; Oliarnyk and Robertson 1996) and 0.90 ± 0.18 ha (burst sampling, n = 14, range = 0.23-2.21 ha; Barg et al. 2005); and in Tennessee, 0.45 ± 0.05 ha (burst sampling, range = 0.11-1.11 ha, n = 30; T.J. Boves unpub. data).

Nature and extent of territory has not been studied in detail. Although most observers treat the species as exhibiting all-purpose territories, this topic deserves further study. Several have documented the species occurring in aggregates, groups, or "colonies" during the breeding season (Oliarnyk and Robertson 1996, J. Sheehan pers. comm., Roth and Islam 2007).

Audubon (Audubon 1856) noted that adults often take their fledglings to areas with extensive tangles of grape vines (Vitis sp.). Same behavior noted in the Mississippi Alluvial Valley (PBH). In the Cumberland Mtns., a banded male was observed foraging with 2 juveniles 30 d after the nest he was associated with fledged (Boves and Buehler 2012).

Winter territoriality not clear. In Venezuela, Bakermans et al. (2009) report some individuals behaving in a territorial manner, while others behave as non-territorial members of mixed-flocks.

Delancey, A. D., and K. Islam. 2019. Post-fledging habitat use in a declining songbird. PeerJ 7:e7358. doi: 10.7717/peerj.7358

Distance fledglings traveled varied after leaving the nest. Within 3 weeks from leaving the nest, the furthest distance from the nest traveled by fledglings averaged 383.3 m (12m after 1 day to 1393m after 14 days).

Raybuck, D. W., J. L. Larkin, S. H. Stoleson, and T. J. Boves. 2020. Radio-tracking reveals insight into survival and dynamic habitat selection of fledgling Cerulean Warblers. Ornithological Applications 122(1):duz063. https://doi.org/10.1093/condor/duz063

Distance fledglings traveled varied after leaving the nest. During ages 0-2 days post-fledging, juveniles remained within 45 ± 11 m from the nest; during ages 3-6 days, brood division occurred for most family groups, with some (n = 6) radio-tracked fledglings following the mother and some (n = 6) following the social father up to 150 ± 42 m from the nest. By ages 7-12 days, most fledglings (88%) had dispersed beyond their social father's breeding territory (up to 305 ± 76 m from the nest). During ages 13-20 days, fledglings were often located in areas where we never detected singing males during the nesting period (717 ± 169 m from the nest). By the end of the tracking period (28.1 ± 1.8 days, maximum = 36 days), the average maximum distance fledglings had moved from their nest was 2.4 ± 0.7 km (range: 1.0-5.3 km).

Roth, K. L. and K. Islam. 2007. Do Cerulean Warblers (Dendroica cerulea) exhibit clustered territoriality? The American Midland Naturalist 157(2):345-355.

Cerulean territories may be clustered, with average distances between neighbors ranging from 141.8m to 572.6 m (range 57-1215m).

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Chimney Swift
Chaetura pelagica

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5310	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5314	Breeding	Breeding Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5315	Breeding	Breeding Sighting-Confirmed	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Chimney swifts can forage up to 6km from nest sites, but most of the time they forage <500 m from the nest. Re-nesting pairs move an average 300 m (range 100-1600m) to a new nest location, and adults and chicks will roost communally < 2km from the nest a few weeks after fledging. Based on this information, breeding occurrences will receive a 500-meter buffer to incorporate the core home ranges of breeding individuals.

Non-breeding individuals are not state listed at this time so will not be valued in the Landscape Project. Because little information is known about non-breeding activities, the default buffer size of 71.25m was chosen.

Literature:

Steeves, T. K., S. B. Kearney-McGee, M. A. Rubega, C. L. Cink, and C. T. Collins (2020). Chimney Swift (Chaetura pelagica), 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.chiswi.01

May forage some distance away from nest site; in New York State, some individuals foraged 3-6 km away (Fischer 1958). Automated radio-tracking arrays with maximum detection distances of 5 km detected radio-tagged swifts (n=11), nesting within 2.14 km of the array, about 40% of the time during daylight hours (Wheeler 2013).

Few data for home ranges. For 10 color-marked birds in Kansas, 50% of the time spent foraging was near nest sites (< 0.5 km). Breeding birds observed foraging 2-6 km from nest site (Fischer 1958). More study needed. Movements to new house chimneys in Kansas averaged 0.3 km (range 0.1-1.6 km). After completing annual nesting attempts, some adults and juveniles join larger communal roosts, while others remain at nest site (Dexter 1969). Fledglings and adults used chimneys < 2 km away from nests a few weeks after fledgling.

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Cliff Swallow
Petrochelidon pyrrhonota

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5322	Breeding	Breeding Sighting	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5324	Breeding	Breeding Sighting-Confirmed	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5326	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

This species is not territorial but highly mobile, particularly for foraging and fledgling dispersal (Brown and Brown 1995). In New Jersey, most large colonies occur on the undersides of bridges over the Delaware River. The breeding buffer was based on the foraging distance that most cliff swallows travel (Brown and Brown 2002). The non-breeding population is listed as stable in New Jersey, so the default buffer was chosen and will not be used in the Landscape Project

Literature:

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.

Most colony sites are located near open fields or pastures where the birds forage, and a water source is often nearby. Proximity to mud source (for nest-building) is often cited as a breeding-habitat requirement (Emlen 1941, 1952), although some colonies are located several kilometers from the nearest mud supply (Coffey 1980, CRB, MBB).

Juveniles travel up to 2-3 km from their natal colony to a creche site as soon as they fledge (CRB, MBB). Birds from different colonies may mix in the same creche, with membership changing daily as more young fledge and others become independent and leave. Birds often creche at the same physical location throughout a season or until all young from the local colonies have fledged.Wintering individuals can forage up to 20 km from roost site.

Some birds move relatively long distances between colonies within a season: up to 40 km in California and 64 km in Nebraska. Adults, like juveniles, spend up to a week or more in mid- to late summer visiting multiple colony sites near their breeding colony of that year. Birds probably use this time to assess suitability of sites (e.g., parasite load, food availability) and use that information in part to choose colonies the next spring (Brown and Brown in press).While selecting colonies in early spring, males and females generally ranged linear distances of 2-15 and 9-14 km, respectively, along a Nebraska river valley where colony sites were located (Brown and Brown in press). Once a bird selects a colony, most foraging is confined to areas within about a 1.5-km radius of the colony site (Brown et al. 1992), although birds occasionally forage up to 6 km from their colony (Emlen 1952). Late in season, after young fledge, birds of all ages and sexes travel widely and visit colonies up to 60 km (and probably farther) from their natal or breeding colonies (CRB, MBB). Two radio-tagged postbreeding males confined their activities to a linear region of 15 and 19.5 km along a river valley for at least 6-8 d (Brown and Brown in press). Within-season homing is well developed over moderately long distances: adults in California were released at distances of 58, 68, 112, 136, and 184 km from their nesting sites, and birds from each distance returned to their colonies (Mayhew 1963).

Brown, Charles R. and Mary B. Brown. 2002. Does intercolony competition for food affect colony choice in cliff swallows? The Condor, 104(1):117-128.

Past work has shown that virtually all foraging by colony residents occurs within a 1-km radius of a colony site (except in bad weather, when foraging ranges increase), regardless of colony size or habitat type.

Because previous observations had indicated that Cliff Swallows confine their foraging to within a l-km radius of their colony site (Brown et al. 1992, Brown and Brown 1996), we designated the foraging range for each colony as a 785-ha circle of diameter 2 km centered at the colony site. The only occasions when the birds did not use this colony-centered foraging range was during cold or windy weather when individuals from many colonies would concentrate in hundreds or thousands over lakes or streams and forage on insects just above the water surface, or in canyons where the walls served as windbreaks to concentrate insects. On these occasions birds would travel 3 km or more from their colony sites and mix with birds from many colonies. Bad weather was infrequent enough during most years that we disregarded it in designating foraging ranges. Using topographic maps, we measured the linear distances between all colony sites. We defined any colony within 2 km of a given colony site as a neighboring colony with an overlapping foraging range. We scored sites only as overlapping or not, and did not quantify the degree of overlap. However, for a subset of colonies, we investigated whether the degree of overlap had any apparent effect; we did this by comparing colonies that had overlapping neighbors situated at different linear distances within 2 km.

We found only weak evidence that Cliff Swallow colony size at a site might have been influenced by competition for food from neighboring colonies. As predicted by the intercolony-competition hypothesis, in some years there was a pattern of the largest colonies occurring in areas with limited foraging-range overlap from other sites, and some of the smaller colonies were ones that overlapped with neighboring sites containing many nests. Furthermore, annual variability in colony size seemed to increase as a site shared its foraging range with more neighbors. However, the statistical patterns across all analyses were weak, the among-year analyses within sites showed almost no evidence that intercolony competition influenced settlement decisions, and there were many small to medium-sized colonies that shared their foraging range with other small to medium-sized colonies.

Last researched by: Petzinger

Date researched: 9/30/2008

Aves

Common Nighthawk
Chordeiles minor

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5335	Breeding	Breeding Sighting-Confirmed	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5338	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5339	Breeding	Breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 4 - 34 ha depending on habitat. The breeding occurrence area was chosen based upon the upper limit of the breeding territories (28 ha) for nesting habitat. Common nighthawks migrate in flocks and are not territorial, but little information is available about stopover habitat use, so the default occurrence area was chosen for migrant nighthawks.

Literature:

Poulin, R. G., S. D. Grindal, and R. M. Brigham. 1996. Common Nighthawk (Chordeiles minor). In The Birds of North America, No. 213 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Nesting habitat includes coastal sand dunes and beaches, logged or slashburned areas of forest sites, woodland clearings, prairies and plains, sagebrush and grassland habitat, farm fields, open forests, rock outcrops, and flat gravel rooftops of city buildings. Nests in open areas on the ground in Texas, extensively logged and burned areas in British Columbia, on bare sand and among small tufts of grass in Louisiana, in cultivated fields or atop fence posts throughout its range, and in open native grassland in s.-central Canada and n.-central U.S.. Prefers flat, gravel roofs in urban areas. Generally selects large roofs with parapet, close to walls (<0.5 m), and not according to roof height. Aluminum roofs avoided, and flat roofs not used in the Okanagan Valley, BC, where natural sites are apparently preferred. Density of flat roofs is primary factor in selection of urban home ranges. Nesting areas chosen secondarily in association with large trees for roosting and vegetation for the production of flying insects for food. Average commuting distance from roost to feeding grounds is 2.7 km (SE ± 0.1, n = 284 trips). No evidence of roosting or nesting to minimize commuting distance to feeding areas.

Strongly territorial - males seldom cross territorial boundaries. Around Saskatoon, SK, greatest number of territories (n = 48) found within city limits, with greatest density downtown; 1 male/18.62 ha downtown, 1 male/33.6 ha in natural field.
Variable territory size in different habitats. In cities: in Saskatoon, SK, 10.53 ha; in Detroit, MI, 10.4 ha (range 4.14-22.8) for 13 territories defended by males. In natural habitat: 28.34 ha (field). Home range size not correlated with measured environmental factors. Generally the same as

territory. Average home range 10.5 ha (urban), 10.4 ha (Detroit, MI), 28.34 ha (field).

Few data on migratory stopover habitat; farmlands, river valleys, marshes, coastal dunes (e.g., s. New Jersey), open woodlands.

Last researched by: Petzinger

Date researched: 9/30/2008

Aves

Common Tern
Sterna hirundo

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5340	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5341	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
5342	Breeding	Suspected Breeding Location	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5343	Breeding	Nesting Colony	50 meter radii around nest/colony	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes
5344	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5345	Breeding	Foraging	7.5 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes

Justification:

In New Jersey, common terns nest in the coastal landscape on wrack mats on marsh islands and in the dunes of barrier islands. They forage for small fish in the ocean or bay and their commuting distances are widely reported in the literature. The birds of North America notes that across the breeding range, most breeding birds feed within 20 km of colony-sites, often much less if numbers small and/or prey locally abundant. (Nisbet 2002). On the Atlantic Coast they usually foraged within 1 km of shore. (Duffy 1986). At Lake Ontario most terns flew either 0.9 km to a small pond (30% of trips) or 1-8 km to other foraging sites (Moore 1993). In another study the mean trip distance for foraging flights for common terns was 2.4-4.2 km, with a maximum distance of 20 km (n = 99 males, >1,000 trips) (Moore 2001). Individuals from Bird Island, Massachusetts were observed defending feeding territories up to 19 km away from nesting colonies. (Nisbet 1983). Another study at Bird Island fund that some terns made triangular feeding flights of at least 60 km, including 15 km return flights with fish. (Heinemann 1992). Around Cape Cod, Massachusetts, terns fed in tidal inlets or between islands but were also observed feeding up to 20 km offshore. (Trull et al. 1999). The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 5 km (NatureServe 2007).

Literature:

Duffy, D.C. 1986. Foraging at patches: interactions between Common and Roseate Terns. Ornis Scand. 17: 47-52.

On Atlantic Coast, the terns usually foraged within 1 km of shore.

Heinemann, D. 1992. Foraging ecology of Roseate Terns on Bird Island, Buzzards Bay, Massachusetts. U.S. Fish and Wildlife Service, Newton Corner, MA.

Some birds nesting at Bird Island, Massachusetts made triangular feeding flights of at least 60 km, including 15 km return flights with fish.

Moore, D.J. 2001. The provisioning tactics of parent Common Terns (Sterna hirundo) in relation to brood energy requirement. Ph.D. dissertation, Simon Fraser Univ., Burnaby, British Columbia.

The mean trip distance for foraging flights for common terns was 2.4-4.2 km, with a maximum distance of 20 km (n = 99 males, >1,000 trips).

Moore, D.J. 1993. Foraging ecology and parental care of Common Terns (Sterna hirundo) nesting in Windermere Basin, Lake Ontario. M.S. thesis, Brock Univ., St. Catharines, Ontario.

At Lake Ontario most birds flew either 0.9 km to a small pond (30% of trips) or 1-8 km to other foraging sites.

NatureServe. 2007. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.2. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: August 2, 2007).

The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 5 km.

Nisbet, I. C. T. 2002. Common Tern (Sterna hirundo). In The Birds of North America, No. 618 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Most breeding birds feed within 20 km of colony-sites, often much less if numbers small and/or prey locally abundant.

Nisbet, I.C.T. 1983. Territorial feeding by Common Terns. Colonial Waterbirds 6: 64-70.

Some birds from Bird Island were observed defending feeding territories up to 19 km away from nesting colonies.

Trull, P., S. Hecker, M. J. Watson, I. C. T. Nisbet 1999. Staging of Roseate Terns Sterna dougallii in the post-breeding period around Cape Cod, Massachusetts, USA. Atlantic Seabirds 1: 145-158.

Around Cape Cod, Massachusetts, many terns fed in tidal inlets or between islands. They were observed feeding up to 20 km offshore.

Last researched by: Davis

Date researched: 1/1/2007

Aves

Eastern Meadowlark

Sturnella magna

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5370	Not applicable	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5374	Not applicable	Breeding Sighting-Confirmed	125 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5375	Not applicable	Breeding Sighting	125 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 1.2 - 6.1 ha (Hull 2000, Lanyon 1995) but commonly range from 2.8 - 3.2 ha (Lanyon 1995). The breeding occurrence area is based upon the upper limit of territory sizes. Because little is known about migratory stopover or wintering habitat use, the default occurrence area was chosen for the non-breeding individuals.

Literature:

Hull, S. D. 2000 (revised 2002). Effects of management practice on grassland birds: Eastern Meadowlark. Northern Prairie Wildlife Research Center, Jamestown, ND. 35 pages.

Territories range from 1.2 - 4.8 ha and seem to prefer areas > 5 ha for breeding. Not affected by core area (or lack thereof). Had 50% incidence at 5 ha. Wisconsin territories ranged from 1.2 - 6 ha with an average of 2.3 ha. Oklahoma territories averaged 2 ha. In PA they were found in warm and cool-season grasses and fields > 1.4 ha. Not considered area sensitive by studies in New York and Missouri. 50% incidence at 5 ha. In Maine 40% incidence at 500 ha grassland barrens.

Lanyon, W. E. 1995. Eastern Meadowlark (Sturnella magna). In The Birds of North America, No. 160 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Territories in Wisconsin varied from 1.2 to 6.1 ha but commonly 2.8 - 3.2 ha. In New York, 15 territories averaged 2.8 ha. Wintering habitat consists of open country, including cultivated fields and feedlots; also marshes. Northern limit of winter range correlated with temperature: absent from regions having mean minimum winter temperature below -12°C.

Mitchell, L. R., C. R. Smith and R. A. Malecki, R. A. 2000. Ecology of grassland breeding birds in the northeastern US - a literature review with recommendations for management. USGS, BRD, NY Cooperative Fish and Wildlife Research Unit, DNR, Cornell University, Ithaca, NY 14853-3011. September 2000.

Meadowlarks tend to use areas > 20 ha.

Vickery, P. D., M. L. Hunter, Jr. and S. M. Melvin. 1994. Effects of habitat area on the distribution of grassland birds in Maine. Conservation Biology 8(4): 1087-1097.

Meadowlarks have positive area effects but had low incidence because sites did not have enough graminoid cover to be a preferred site.

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Eastern Whip-poor-will
Antrostomus vociferus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5646	Breeding	Breeding Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5649	Nonbreeding	Non-breeding Sighting	75 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5651	Breeding	Breeding Sighting-Confirmed	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 2.8 - 11.1 ha with an average 5.1 ha. Little is known about home range sizes, which are larger than territories and usually within 500 m from nest sites (Cink et al. 2020). Therefore, the breeding occurrence area was chosen based upon the upper limit of the foraging distance from the nest.

Whip-poor-wills may be territorial during the non-breeding season, so the average territory size of 1.8 ha for wintering individuals was used to select the SOA buffer size of 75 meters for non-breeding individuals.

Literature:

Cink, C. L. P. Pyle, and M. A. Patten (2020). Eastern Whip-poor-will (Antrostomus vociferus), 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.whip-p1.01.

During the breeding period, Eastern Whip-poor-wills travel large distances while foraging. In Kansas, size of territories varied from 2.8 to 11.1 ha (n = 3). In another study, most (52% of 26 birds) averaged 5.1 ha. Factors influencing territory size are unknown. Little information on home range sizes, but banded breeding birds rarely forage > 500 m from nest sites (CLC).

Little is known about fledgling dispersal, but parents will continue to feed fledglings 30 days old.

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. Overwintering territories in Florida were defended and average 1.8 ha in size, though territorial response to song playback is weak and actual size may be underestimated. Marked birds overwintering in central Florida seem to confine their activities to areas of about 400 m2.

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Field Sparrow
Spizella pusilla

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5395	Breeding	Breeding Sighting	171.25 meters	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5397	Breeding	Breeding Sighting-Confirmed	171.25 meters	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5398	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Adults tend to have small territories but with high variability based on habitat type. They are somewhat area sensitive in terms of development, however, so a 100-m buffer will be added to the default radius.

"Mean territory size in Illinois was 0.76 ha, range 0.31-1.62 ha; larger territories associated with open grassland (Best 1977d).

Generally breed in successional old fields, woodland openings and edges, roadsides and railroads near open fields. Does not breed close to human habitation; occasionally found in Christmas tree farms, orchards, and nurseries (Peterjohn and Rice 1991). Will nest in old fields directly after a burn or within a year of cultivation, but only if there is scattered woody vegetation with elevated perches in the territory. As thickets of trees spread in the habitat, numbers decline. The general trend for old field habitats is that Field Sparrows begin breeding within 1-2 years after human uses stop; population sizes rise for perhaps a decade, then decline. After ~30 yr of old field succession, the habitat is overgrown with trees and shrubs and no longer used for breeding (MC)."

Literature:

Carey, M., D. E. Burhans, and D. A. Nelson (2008). Field Sparrow (Spizella pusilla), version 2.0. In The Birds of North America (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.103

Last researched by: Petzinger

Date researched: 12/26/2018

Aves

Glossy Ibis
Plegadis falcinellus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5400	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5401	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
5402	Breeding	Foraging	9.1 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5403	Breeding	Roosting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5404	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5405	Breeding	Nesting Colony	71.25 Meter Buffer	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes

Justification:

Nesting colony is defined by the area the birds actually use, as these birds do not defend a territory except immediately around their individual nests. The boundaries of the colony are defined as much by social attraction phenomenon and by habitat suitability. Consequently there is now immediately apparent justification for buffering the mapped extent of a nesting area. Where the mapped extent of a colony was available it was used. Where the mapped extent was not available the default seconds precision circle was used around the recorded nesting location point.

ENSP reviewed the literature regarding commuting distance for colonial nesting long-legged wading birds which fairly consistently indicates that the importance of suitable foraging habitat decreases with the distance from the nesting area (e.g. Dowd and Flake 1985, Custer et al. 2004, Kelly et al 1993, Thompson 1978). This is not surprising considering the energy demands of long commutes and the fact that, all other things being equal, if suitable foraging habitat is randomly distributed within the possible foraging range, simple geometry would argue that availability would increase with the square of the distance from the colony. Consequently, a particular type of wetland or riparian habitat is more critical if it is located close to a nesting area than a similar area located near the edge of the energetically feasible foraging range from the colony. It would therefore be unjustifiable to use the maximum foraging distance figures to define all potential foraging habitat as critical foraging habitat for a particular nesting colony. Conversely, using an average foraging

distance figure may under-include suitable habitat by omitting some foraging areas that are important because they provide particularly rich and easily exploited feeding habitat. Further, research (Custer et al. 2004) indicates that longer commuting distances are more frequent during high-demand and demographically critical nestling rearing period. Where the literature on commuting distance includes several studies, there can be wide variability in the mean commuting distances between different studies. When such was the case, we either averaged the reported mean commuting distances or used the information from the study with a large sample size or from an area most ecologically similar to New Jersey. We then doubled this figure.

Research in North Carolina found that 84% of breeding long-legged waterbirds flew to foraging areas, which is why habitat outside the vicinity of the colony must be valued as crucial to the success of the colony (Custer and Osborn 1978). This same study documented the mean distance flown to foraging habitat by glossy ibis was 7.3 km with a maximum distance flown as 12.4km. (Custer and Osborn 1978). In New Jersey, glossy ibis use the entire area of salt marsh pools rather than just the edge as other long legged species may be inclined to do (Wiese 1979). NatureServe recommends a minimum inferred extent of 3 km and justifies it by noting a low mean foraging range size for this group (NatureServe 2006). We apply a 14.6 km radius around a colony to protect foraging areas.

Literature:

Custer, C.M., S.A. Suarez, D.A. Olsen. 2004. Feeding habitat characteristics of the Great Blue Heron and Great Egret nesting along the Upper Mississippi River, 1995-1998. Waterbirds 27(4): 454-68.

The majority of the herons in this study fed <5 km from the nesting site, and avoided areas > 10 km away. They flew farther to sites during the brood-rearing period than during incubation. Only 10% of the feeding flights ended at a location where another heron was present, indicating that they prefer to feed alone.

Custer, T. W., R. G. Osborn. 1978. Feeding habitat use by colonially-breeding herons, egrets, and ibises in North Carolina. Auk 95: 733-743.

In North Carolina, this small-scale study found that the mean distance to foraging habitat during breeding season was 7.3 km (n = 5). The longest observed flight was 12.4 km. In North Carolina, 84% of breeding individuals flew to tidal foraging habitat. They generally prefer brackish/marine habitats with relatively shallow water.

Dowd and Flake. 1985. Foraging habits and movements of nesting Great Blue Heron in prairie river ecosystem, South Dakota. Journal of Field ornithology 56: 377-87.

A study in South Dakota found that the average distance that great blues flew from their colony to a foraging site was 3.1 km, and the maximum observed distance was 24.4 km. Eighty-five percent of the herons in the study fed within 4 km of the colony.

Kelly J. P., H. M. Pratt, P. L. Greene. 1993. The distribution, reproductive success, and habitat characteristics of heron and egret breeding colonies in the San Francisco Bay area. Colonial Waterbirds. 16:18-27.

> 95% of great blue herons and >90% great egrets fed within 20 km of their colony.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 4, 2007).

The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 3 km. For

the breeding season, this figure is based on a low mean foraging range size for this group.

Thompson. 1978. Feeding areas of Great Blue Herons and Great Egrets nesting in the floodplain of the upper Mississippi River. Proc. Colonial Waterbird Group. 2: 202-13.

In central Minnesota the average distance that the herons flew from the colony to a foraging area was 6.5 km, and the maximum observed was 20.4 km. Fifty-three percent of the herons in the study fed within 4 km of the colony.

Wiese, J. H. 1979. A study of the reproductive biology of herons, egrets, and ibis nesting on Pea Patch Island, Delaware. Final report. Manomet Bird Observertory, Manomet, MA.

In salt-marsh pools in New Jersey, ibises use the entire pool rather than just the edge.

Last researched by: Davis

Date researched: 1/1/2007

Aves

Golden-winged Warbler
Vermivora chrysoptera

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5408	Breeding	Breeding Sighting-Confirmed	1500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5409	Nonbreeding	Non-breeding Sighting	180 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5410	Breeding	Breeding Sighting	1500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Average territory sizes range from 0.2-6 ha (up to 22.6 ha; Confer et al. 2020) but many breeding individuals traveled up to 1.5 km from their territory boundaries and had much larger home ranges than their song-delineated breeding territories (mean 11.8 ha, range 1.4 - 48 ha; Aldinger et al. 2015, Frantz 2013, Frantz et al. 2016). In New Jersey, spot-mapped territory sizes ranged from 0.17 to 7.84 hectares with the mean territory size of 1.66 (± 0.42) hectares and males were observed in areas > 800 meters from their nest and defended territory (DeFalco pers. obs.). Fledglings 6-28 days post-fledging, still under the care of a parent, were located an average distance ranging from 428.4 m to 749 m from the nest (range 38.9-3600.2 m), depending on location (Aldinger et al. 2015, Frantz 2013, Frantz et al. 2016). Based on this information, the breeding occurrence area was chosen based the upper range of radio telemetry movements of breeding adults and fledglings while still under the care of a parent.

Little is known about territorial or foraging behavior during migration, but Golden-winged Warblers are territorial on the wintering grounds (Bennett et al. 2016). The non-breeding occurrence area for this species was based on the upper limit territory size of the species during the non-breeding period.

Literature:

Aldinger, K., M. H. Bakermans, J. Larkin, J. Lehman, D. J. McNeil Jr., and A. Tisdale. 2015. Monitoring and evaluating golden-winged warbler use of breeding habitat created by the Natural Resources Conservation Services Practices: A conservation effects assessment project (CEAP). Cooperative agreement #68-7482-12-502, Phase I: 2012-14 Final Report.

Although there was variation among males in their territorial behavior, we successfully mapped 739 Vermivora spp. territories during the study. Golden-winged (n = 663; 90%) were most common, followed by Brewster’s (n = 46; 6%), Blue-winged (n = 29; 4%), and Lawrence’s (n = 1; <1%) Warblers. Overall territory size was strongly positively skewed so that 90% of all territories were <3 ha in size, averaged 1.52 ± 0.1 ha, and ranged from 0.002 to 22.6 ha (Figure 13, Table 10). Large territories appeared to be the result of 1) unpaired males traveling in search of mates; 2) males that shifted territories during the breeding season; or 3) territories that included non-nesting habitat (i.e., grass fields and closed-canopy forest) within the minimum convex polygon. Excluding seven male Golden-winged Warblers that exhibited these characteristics, the mean and median territory sizes were 1.32 ± 0.07 and 0.88 ha, respectively.

Among radio-marked adult males, home ranges (100% MCPs) averaged 11.8 ha (range 2.27-47.99) and were larger than spot-mapped territories (Wilcoxon Signed Rank test: $Z7 = -2.37$, $P = 0.018$; Table 19), which averaged 2.4 ha (range 0.79-4.77). Core telemetry-territories (50% MCP) averaged 0.6 ha (range 0.2-1.28) and were also larger than core spot-mapped territories (50% MCP) ($t6 = -2.75$, $P = 0.033$) which averaged 0.3 ha (range 0.13-0.63).

Fledglings were located an average 428.4 meters from the nest 20 days after leaving the nest.

Bennett, R.E., A. Rothman, K.V. Rosenberg, F. Rodriguez. 2016. Golden-winged Warbler nonbreeding season conservation plan. In Roth, A.M., R.W. Rohrbaugh, T. Will, and D.A. Buehler, editors. Golden-winged Warbler Status Review and Conservation Plan. www.gwwa.org/

Golden-winged Warblers maintain large, fixed territories throughout the winter season and aggressively defend them against conspecifics. Telemetry work shows that Golden-winged Warblers maintain territories with an average size of 8.77 ha (±0.92 ha) in Monteverde, Costa Rica and 4.09 ha (±1.30 ha) in Nicaragua. Individuals generally use one or two core areas where foraging activity is concentrated, although individuals in Nicaragua and Costa Rica have been observed to conduct brief, long-distance forays outside of their normal home ranges.

Confer, J. L., P. Hartman, and A. Roth (2020). Golden-winged Warbler (Vermivora chrysoptera), 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.gowwar.01

Recorded territory sizes range from 0.2 to 6.0 ha. Boundaries often determined by edge or row of tall trees and by interactions with neighboring males. In n. Wisconsin, Roth and Lutz (2004) reported a mean territory area of 0.82 ha in seedling aspen clearcuts (less than 10-years post-harvest) and 0.18 to 0.54 in sapling and pole-sized clearcuts (11-25 years post-harvest). They speculated that territory area in seedling-sized clearcuts was primarily influenced by neighboring males, and territory area in older clearcuts was largely constrained by the shape of the occupied forest openings where aspen regeneration was poor. In the Lower Peninsula of Michigan, Murray and Gill (1976) reported mean territory area as 1.9 ha and 2.7 ha for two tamarack swamp sites, and Will (1986) observed a mean area of 1.0 in a forest-field ecotone.

In Kentucky, in hilltop removal sites territory size averaged 1.2 ha in sites with only Golden-winged Warblers and 1.7 ha in sites sympatric with Blue-winged Warblers (range = 0.2 to 5.8 ha) (Patton et al. in press). Density may influence territory size; e.g., one male sang from trees around the perimeter of a field 300 x 300 m and responded to taped playbacks throughout this area. The next season an additional male moved into the field and the territory size of the returning male was halved (JLC).

Territories are distributed where habitat is most suitable and consequently appear as neighborhoods in heterogeneous habitat mosaics (Reitsma et al. unpubl. data). Territories can overlap to some degree, but such boundaries often remain in dispute. Nests are often within 30 m of each other. In one case in New Hampshire, two nests were 32 m apart, both within the same male's territory, suggesting a polygamous male.

Parents may feed fledglings up to 31 days after leaving the nest.

Fiss, C. J., D. J. McNeil, A. D. Rodewald, J. E. Duchamp, and J. L. Larkin. 2020. Post-

fledging Golden-winged Warblers require forests with multiple stand developmental stages. Ornithological Applications 122: 1-13

Sub-broods in both study areas increased their movement rate as they aged. During days 1-5 post-fledging, sub-broods made average daily movements of 38.7 m (range: 5.3-127.5 m) in the NE and 44.9 m (range: 3.0-104.7 m) in the NC. During days 6-28, sub-broods made average daily movements of 155.9 m (range: 61.1-322.8 m) in the NE and 156.7 m (range: 56.9-369.1 m) in the NC (Figure 3). Golden-winged Warbler sub-broods also moved farther from nest sites as they aged. In both study areas, sub-broods remained proximate to nesting locations during days 1-5 (NE: $\bar{x}$ = 92.5 m, range: 6.1-278.9 m; NC: $\bar{x}$ = 106.0 m, range: 4.1-266.1 m). Sub-broods in both study areas were substantially farther from nest sites during days 6-28 post-fledging (NE: $\bar{x}$ = 749.3 m, range: 207.4-2042.8 m; NC: $\bar{x}$ = 694.3 m, range: 38.9-3600.2 m; Figure 3), and there was no significant difference in dispersal distance between study areas during this time ($P > 0.05$).

Frantz, M. W. 2013. Is spot-mapping missing important aspects of golden-winged warbler (Vermivora chrysoptera) breeding habitat? Master's Thesis, Indiana University of Pennsylvania. Thesis and Dissertations. 1197. http://knowledge.library.iup.edu/etd/1197

Telemetry use areas (100% MCPs) were larger than spot mapped territories ($t11 = 4.156$, $p = 0.002$; Table 1). Spot-mapped territories at Sproul (n=9) ranged from 0.65- 3.69 ha (mean = 1.92 ha ± 0.29 SE) whereas telemetry use areas ranged from 1.40-19.76 ha (mean = 7.28 ha ± 2.24). Spot mapped territories at Bald Eagle (n=3) were between 0.83-1.48 ha (mean = 1.18 ha ± 0.19), whereas telemetry use areas ranged from 2.25-5.41 ha (mean = 3.38 ha ± 1.02). Average 100% MCP spot mapped territory and telemetry use areas for both study sites combined were 1.74 ha ± 0.24 and 6.30 ha ± 1.74 respectively. Core telemetry use areas (50% MCP) (0.50 ha ± 0.08) were also larger than core spot-mapped territories (0.26 ha ± 0.05) ($t11 = 2.341$, $p = 0.039$) (Table 1).

Frantz, M. W., K. R. Aldinger, P. B. Wood, J. Duchamp, T. Nuttle, A. Vitz, and J. L. Larkin. 2016. Space and habitat use of breeding Golden-winged Warblers in central Appalachian Mountains. Pp. 81-84 in H. M. Streby, D. E. Andersen, and D. A. Buehler (editors). Golden-winged Warbler ecology, conservation, and habitat management. Studies in Avian Biology (no. 49), CRC Press, Boca Raton, FL.

Among radiomarked males, home ranges (100% MCPs) were larger than spot-mapped territories in Pennsylvania (1.40–19.76 ha; t-test: $t11 = 4.16$, $P = 0.002$) and West Virginia (2.27-47.99 ha; Wilcoxon Signed Rank test: $Z7 = -2.37$, $P = 0.018$; Table 5.1). Core home ranges (50% MCP) also were larger than core spot-mapped territories (50% MCP) in Pennsylvania (0.13-1.03 ha; $t11 = 2.34$, $P = 0.039$) and West Virginia (0.20-1.28 ha; $t6 = -2.75$, $P = 0.033$). Although core areas (50% MCPs) averaged two times larger when delineated by telemetry than spot-mapping (Table 5.1), a majority of telemetry and spot-mapped core areas overlapped (15 of 19 individuals; Figure 5.2).

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Grasshopper Sparrow
Ammodramus savannarum

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4776	Breeding	Breeding Sighting-Confirmed	90 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4778	Breeding	Breeding Sighting	90 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4779	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Mean breeding territories range from 0.19 to the highest upper confidence limit of 2.76 ha (Vickery 1996). The breeding occurrence area was chosen based upon the upper limit territory size. Little is known about the stopover habitat use, so the default occurrence area was chosen for the migrant individuals.

Literature:

Dechant, J. A., M. F. Dinkins, D. H. Johnson, L. D. Igl, C. M. Goldade, B. D. Parkin, and B. R. Euliss. 1998 (revised 2002). Effects of management practice on grassland birds: Grasshopper Sparrow. Northern Prairie Wildlife Research Center, Jamestown, ND. 28 pages.

Average territory size < 2 ha. Minimum area need to support breeding population may be > 30 ha. Illinois minimum area 10-30 ha, not found in areas <10 ha, Nebraska 8- 12 ha with perimeter-area ratio of 0.018.

Mitchell, L. R., C. R. Smith and R. A. Malecki, R. A. 2000. Ecology of grassland breeding birds in the northeastern US - a literature review with recommendations for management. USGS, BRD, NY Cooperative Fish and Wildlife Research Unit, DNR, Cornell University, Ithaca, NY 14853-3011. September 2000.

Vickery, P. D. 1996. Grasshopper Sparrow (Ammodramus savannarum). In The Birds of North America, No. 239 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Minimum area requirements in Maine was 100 ha, Illinois 30 ha. Historically found in natural clearings a few ha in size. Pennsylvania territories average 0.8 ha, Connecticut 0.66 ± 0.39 (SE) ha in 1986 (n = 11) and 0.78 ± 0.24 (SE) ha in 1987, Wisconsin 0.85 ha, Michigan 1.4 ha, Florida 1.8 ± 0.96 ha. Western PA territories 0.19 ± 0.13 SD, W. Virginia 0.32 ha, s. California 0.37 ± 0.16 SD. Territories shift during breeding season with arrival of late males. Males sing >50 m from nest.

Vickery, P. D., M. L. Hunter, Jr. and S. M. Melvin. 1994. Effects of habitat area on the distribution of grassland birds in Maine. Conservation Biology 8(4): 1087-1097.

In Maine, Grasshopper sparrows reached 50% incidence at 100 ha, which may differ from other areas due to rarity of species in Maine.

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Great Blue Heron
Ardea herodias

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5419	Breeding	Roosting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5420	Breeding	Foraging	7.5 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5421	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5422	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
5423	Breeding	Nesting Colony	71.25 Meter Buffer	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes
5424	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Nesting area is defined by the area the birds actually use, as these birds do not defend a territory except immediately around their individual nests. The boundaries of the colony are defined as much by social attraction phenomenon and by habitat suitability. Consequently there is now immediately apparent justification for buffering the mapped extent of a nesting area. Where the mapped extent of a colony was available it was used. Where the mapped extent was not available the default seconds precision circle was used around the recorded nesting location point.

ENSP reviewed the literature regarding commuting distance for colonial nesting long-legged wading birds which fairly consistently indicates that the importance of suitable foraging habitat decreases with the distance from the nesting area (e.g. Dowd and Flake 1985, Custer et al. 2004, Kelly et al 1993, Thompson 1978). This is not surprising considering the energy demands of long commutes and the fact that, all other things being equal, if suitable foraging habitat is randomly distributed within the possible foraging range, simple geometry would argue that availability would increase with the square of the distance from the colony. Consequently, a particular type of wetland or riparian habitat is more critical if it is located close to a nesting area than a similar area located near the edge of the energetically feasible foraging range from the colony. It would therefore be unjustifiable to use the maximum foraging distance figures to define all potential foraging habitat as critical foraging habitat for a particular nesting colony. Conversely, using an average foraging

distance figure may under-include suitable habitat by omitting some foraging areas that are important because they provide particularly rich and easily exploited feeding habitat. Further, research (Custer et al. 2004) indicates that longer commuting distances are more frequent during high-demand and demographically critical nestling rearing period. Where the literature on commuting distance includes several studies, there can be wide variability in the mean commuting distances between different studies. When such was the case, we either averaged the reported mean commuting distances or used the information from the study with a large sample size or from an area most ecologically similar to New Jersey. We then doubled this figure.

The average foraging flight for great blue herons has been firmly established in the literature. The average foraging flight has been observed at 2.3 km - 6.5 km (Butler 1991, Custer and Galli 2002, Dowd and Flake 1985, Parris 1979, Thompson 1978). The range of distance flown falls between <1 km- 27 km (Custer and Galli 2002, Thompson 1978). Although great blue herons have been recorded feeding as far away as 27 km, three studies found that the majority (at least 50%, and in one study 85%) of nesting herons fed within 4 or 5 km of the colony (Custer et al. 2004, Dowd and Flake 1985, Thompson 1978). Kelly, et al (1993) found that > 95% of great blue herons in their study fed within 20 km of the colony. The NatureServe minimum inferred extent is 3 km (NatureServe 2006). We apply a 12 km radius around a colony to protect foraging areas, which is likely to capture the majority of the foraging habitat for that colony.

Literature:

Butler. 1991. Habitat selection and time of breeding in the Great Blue Heron. PhD dissertation. University of British Columbia, Vancouver.

The average foraging commute in this study is btw. 2.3-6.5 km.

Custer, C.M., J. Galli. 2002. Feeding habitat selection by Great Blue Herons and Great Egrets nesting in east central Minnesota. Waterbirds 25(1): 115-24.

In a study conducted in Minnesota great blue herons flew a median distance of 2.7 km (n=63) from their colony to a foraging area. The range of distances flown fell between <1 km - 27 km. Most wetlands that herons were located at were >350 ha.

Custer, C.M., S.A. Suarez, D.A. Olsen. 2004. Feeding habitat characteristics of the Great Blue Heron and Great Egret nesting along the Upper Mississippi River, 1995-1998. Waterbirds 27(4): 454-68.

The majority of the herons in this study fed <5 km from the nesting site, and avoided areas > 10 km away. They flew farther to sites during the brood-rearing period than during incubation. Only 10% of the feeding flights ended at a location where another heron was present, indicating that they prefer to feed alone.

Dowd and Flake. 1985. Foraging habits and movements of nesting Great Blue Heron in prairie river ecosystem, South Dakota. Journal of Field ornithology 56: 377-87.

A study in South Dakota found that the average distance that great blues flew from their colony to a foraging site was 3.1 km, and the maximum observed distance was 24.4 km. Eighty-five percent of the herons in the study fed within 4 km of the colony.

Kelly J. P., H. M. Pratt, P. L. Greene. 1993. The distribution, reproductive success, and habitat characteristics of heron and egret breeding colonies in the San Francisco Bay area. Colonial Waterbirds. 16:18-27.

> 95% of great blue herons and >90% great egrets fed within 20 km of their colony.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

Inferred minimum extent of habitat use (when actual extent is unknown) is 3 km. This is based on a low mean foraging rate for this group.

Parris. 1979. Aspects of Great Blue Heron foraging ecology in southwest Lake Erie. MS Thesis. Ohio State University, Columbus, Ohio.

The average foraging commute in this study is btw. 2.3-6.5 km.

Thompson. 1978. Feeding areas of Great Blue Herons and Great Egrets nesting in the floodplain of the upper Mississippi River. Proc. Colonial Waterbird Group. 2: 202-13.

In central Minnesota the average distance that the herons flew from the colony to a foraging area was 6.5 km, and the maximum observed was 20.4 km. Fifty-three percent of the herons in the study fed within 4 km of the colony.

Last researched by: Davis

Date researched: 7/1/2006

Aves

Green Heron
Butorides virescens

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6696	Breeding	Breeding Sighting-Confirmed	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6697	Breeding	Foraging	5 km Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
6698	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
6699	Breeding	Roosting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
6700	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
6701	Breeding	Nest	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

This species is a solitary nester and will follow the Biotics buffer assigned to other species in the same family group (American bittern, herons and egrets), as will the sightings, which will be sufficient. There is not a lot of data on foraging commutes in the literature for this species. NatureServe does not provide a minimum extent of habitat use for this species, but does note they can forage up to 1km (0.62 mi) from their nests. It also notes that the separation distance between suitable habitat is 5km (3.1 miles), but absent data notes this is arbitrary. Other species tracked in Biotics in this family group have assigned foraging distances ranging from 7-9 miles (4.3-5.6 miles). Personal communication with local avian experts suggest 5km may be sufficient for this species (Davis & Johnson, personal communication, December 5, 2018).

Literature:

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: December 5, 2018).

Last researched by: Davis

Date researched: 12/5/2018

Aves

Gull-billed Tern
Gelochelidon nilotica

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5431	Breeding	Nesting Colony	71.25 Meter Buffer	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes
5432	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5433	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5434	Breeding	Suspected Breeding Location	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5435	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
5436	Breeding	Foraging	3 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes

Justification:

Gull-billed terns are unique among the breeding terns in New Jersey in that their primary prey items are not small fish. Fish are part of their diet, but they are more likely to consume lizards, insects and chicks of other species (Parnell, et al. 1995). Therefore when looking at the areas to be valued by this model, special attention should be paid to the marsh islands that lie within the radius of the nesting colony, instead just the open water that other tern models value. No species specific information is available for the foraging commute of this species. NatureServe recommends a minimum inferred extent of 2 km, noting that this is a conservative estimate (NatureServe 2006). Considering the paucity of information available we chose to stay consistent with other Sterna species and we apply a 4.8 km buffer around the colony to protect foraging areas.

Literature:

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 4, 2007).

The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 2 km. The authors note that this is a conservative estimate.

Parnell, J.F., R.M., Erwin, K.C. Molina. 1995. Gull-billed tern (Sterna nilotica). In The Birds of North America, No. 140 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia and The American Ornithologist's Union, Washington, D.C.

Unlike other terns nesting in the coastal marshes of New Jersey this species does not feed primarily on fish but instead consumes lizards, insects, and sometimes chicks of other species.

Last researched by: Davis

Date researched: 1/1/2007

Aves

Henslow's Sparrow
Centronyx henslowii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4978	Breeding	Breeding Sighting	75 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4980	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4982	Breeding	Breeding Sighting-Confirmed	75 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 0.18 - 1 ha but have an upper confidence limit of 0.83 ha (Herkert 2001, Herkert et al. 2002). The breeding occurrence area was chosen based on the upper limit territory size and increased to account for shifting territories during the breeding season (Herkert et al. 2002). Little is known about migratory stopover habitat use, so the default buffer was chosen.

Literature:

Herkert, J. R. 1998 (revised 2002). Effects of management practice on grassland birds: Henslow's Sparrow. Northern Prairie Wildlife Research Center, Jamestown, ND. 17 pages.

Individual territories range from 0.18 - 1 ha. In Kansas and New York, HESP are found in areas > 30 ha of grasslands. Illinois had 50% incidence in areas >55 ha. Another study in New York had HESP in areas > 8 ha. Largest patches occupied first, but patches < 50 ha can also be used for breeding. Isolated patches may also affect use of patch - used 16-ha patch that was within 1.6km of larger occupied patch, but absent from 28-ha isolated patch. Territory size in Michigan was 0.3 ha, 0.7 ha ± 0.26 SD (n = 4) in Wisconsin, 0.18 ha ± 0.05 SD (n = 22) in w PA. Territories shift during breeding season.

Herkert, J. R., P. D. Vickery, and D. E. Kroodsma. 2002. Henslow's Sparrow (Ammodramus henslowii). In The Birds of North America, No. 672 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Average territory size was 0.3 ha in Michigan, 0.7 ha ± 0.26 SD (n = 4) in Wisconsin, and 0.18 ha ± 0.05 SD (n = 22) in w. Pennsylvania. Males tend to shift territories throughout the breeding season. In Robins' (1971a) study, 10 males had only 1 territory that appeared to remain stable throughout breeding season, 2 maintained 2 successive territories, 2 had 3 territories, and 4 had 4 territories. Approximately 50% of foraging trips by both sexes were beyond territorial borders defended by males. Males and females tended to forage in separate areas within or close to the home territory; mean distances of males flying from the nest to forage was 30.8 m ± 4.3 SD, of females 24.9 m ± 2.1 SD.
Migratory stopover habitat includes brushy places, along hedgerows, at edges of shrubby places as well as in grassy fields, prairies, and wet meadows.

Mitchell, L. R., C. R. Smith and R. A. Malecki, R. A. 2000. Ecology of grassland breeding birds in the northeastern US - a literature review with recommendations for management. USGS, BRD, NY Cooperative Fish and Wildlife Research Unit, DNR, Cornell University, Ithaca, NY 14853-3011. September 2000.

There were 5 studies in New York: one had minimum area of 36 ha and mean of 66 ha, another minimum of 33.2 ha and mean 51.7 ha, another had habitat size ranging from 4.5 - 8.7 ha, another between 3 and 20 ha, and another stating that at low population numbers Henslows may require larger patches than actual minimum. In Illinois, habitat size ranged from 10-30 ha with 50% incidence at 55 ha. Missouri habitat size ranged from 10 - 100 ha.

Pruitt, L. 1996, Henslow's Sparrow Status Assessment. USFWS, Bloomington, IN.

This species can possibly breed in New Jersey and was confirmed breeding in the 1980s. They do, however, migrate through New Jersey.

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Horned Lark

Eremophila alpestris

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5457	Breeding	Breeding Sighting-Confirmed	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5458	Nonbreeding	Non-breeding Sighting	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5460	Breeding	Breeding Sighting	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Territories range from 0.008 - 5.1 ha (Beason 1995, Dinkins et al. 2000) and there is no minimum patch size (Dinkins et al. 2000, Mitchell et al. 2000). The breeding occurrence area is based upon the upper limit of the largest mean territory size and increased to incorporate the mobility of the species. The migrant and wintering occurrence areas are based upon the wandering flocks formed while migrating and wintering.

Literature:

Beason, R. C. 1995. Horned Lark (Eremophila alpestris). In The Birds of North America, No. 195 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Territories range from 0.6 - 3.1 ha in the midwest, 0.3 - 5.1 ha in Colorado. Territory size is related to density of males in a patch. Adults will fly 40 meters to discard fecal sacs and land 20 m from nest and walk in to feed young. Wintering birds are not territorial and form large flocks that are nomadic and wander over large areas for food.
Migratory stopover habitat is similar to breeding habitat but with increased use of beaches and sand dunes; also mowed areas such as airfields. North American flocks of migrants often intermix with resident conspecifics, and even form mixed-species flocks with other migrants such as longspurs and buntings. Wintering habitat is similar to habitats occupied during breeding and migration periods. In Oklahoma, for example, the shortest vegetation available, in Massachusetts, ocean beaches, sand dunes, airfields. Frequently concentrated along roadsides when ground is covered with deep snow.

Dinkins, M. F., A. L. Zimmerman, J. A. Dechant, B. D. Parkin, D. H. Johnson, L. D. Igl, C. M. Goldade, and B. R. Euliss. 2000 (revised 2002). Effects of management practices on grassland birds: Horned Lark. Northern Prairie Wildlife Research Center, Jamestown, ND. 34 pages.

Colorado territories in lightly-grazed pastures ranged from 0.3 - 1.5 ha and average 0.7 ha; heavily grazed pastures had territories ranging from 1 - 1.7 ha and average 1.5 ha; mixed-grass pasture average 1.1 ha; idle mixed-grass averaged 1.6 ha. Midwestern cropland territories ranged from 0.6 - 3.1 ha and averaged 1.6 ha; hayland territories ranged 1 - 2.5 ha. One Illinois territory was 0.008 ha. Found on patches < 10 ha in Illinois.

Mitchell, L. R., C. R. Smith and R. A. Malecki, R. A. 2000. Ecology of grassland breeding birds in the northeastern US - a literature review with recommendations for management. USGS, BRD, NY Cooperative Fish and Wildlife Research Unit, DNR, Cornell University, Ithaca, NY 14853-3011. September 2000.

Areas range from 1-10 ha.

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Ipswich Sparrow
Passerculus sandwichensis princeps

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5705	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5708	Breeding	Nest	Need Update	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5709	Breeding	Breeding Sighting	Need Update	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5712	Breeding	Urban Nest	Need Update	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Little is known about the wintering and migratory habits of the Ipswich Sparrow. Therefore, the default buffer size will be used.
The Ipswich Sparrow (Passerculus sandwichensis princeps), a subspecies of the Savannah sparrow, winters along the coasts in New England south to the Carolinas. Ipswich Sparrows at all seasons are virtually restricted to coastal marram grass (Ammophila breviligulata) communities, which grow along the coastal sand dunes.
The birds that breed on Sable Is., NS (P. s. princeps) migrate earlier in the spring, and later in the fall, than their smaller conspecifics. P. s. princeps leave their wintering grounds from mid-Mar through early Apr, and arrive in Nova Scotia from late Mar through early May. In fall they start to migrate in mid-Sep and most depart Nova Scotia by early Nov, although some apparently try to overwinter on Sable Is.
Breeding territories on Sable Is., NS 0.38–0.53 ha in densely vegetated habitat, 1.09–1.25 ha in sparse habitat.

Literature:

Wheelwright, N. T. and J. D. Rising (2008). Savannah Sparrow (Passerculus sandwichensis), version 2.0. In The Birds of North America (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.45

Last researched by: Petzinger

Date researched: 9/11/2019

Aves

Kentucky Warbler
Geothlypis formosa

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5462	Breeding	Breeding Sighting	600 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5465	Breeding	Breeding Sighting-Confirmed	600 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5466	Nonbreeding	Non-breeding Sighting	160 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 1.21 to 3.75 ha with an average 2.21 ha, and adults tend to forage 100-500m from territories. Furthermore, fledglings will travel up to 200 m from the nest a week after fledging and can disperse up to 1.5 km from the nest (McDonald 2020). Based on this information, the breeding occurrence area was chosen to incorporate the fledgling dispersal 3 weeks post-fledging and maximum distance adults travel from the territory to forage.

During the non-breeding season, Kentucky Warblers forage in mixed species flocks with Tufted Titmice and are loosely territorial. Non-breeding territories of Tufted Titmouse flocks averaged between 5.4 and 8 ha (Ritchison et al. 2020) so a 160-meter buffer size was chosen based on the radius of the 8-ha average territory size of non-breeding Tufted Titmice.

Literature:

McDonald, M. V. (2020). Kentucky Warbler (Geothlypis formosa), 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.kenwar.01

In Virginia, average territory size is 2.21 ha (range 1.21-3.75, n = 493; MVM). Territory size does not appear to be related to quality (e.g., number of young produced, "richness" or density of vegetation; MVM), although more quantitative data are needed. Early in the breeding season, adults of both sexes sometimes forage off their territories, and seek extra-pair copulations (MVM) as distantly as 500 m, but more often within 100 m of territory. Can also move 100-500m to relocate territories.

Young travel up to 200 m from nest within 1st week of fledging. Fledglings care completely for themselves 3 wk - 1 month after fledging, and distance from nest at this time varies but usually no more than 1.5km from natal territory.

During daytime migratory stopovers, occurs in mixed-species flocks with Carolina Chickadees (P. carolinensis), Tufted Titmice (Parus bicolor), and other warbler species.

Ritchison, G., T. C. Grubb Jr., and V. V. Pravosudov (2020). Tufted Titmouse (Baeolophus

bicolor), 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.tuftit.01

Non-breeding territories of Tufted Titmouse flocks averaged between 5.4 and 8 ha

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

King Rail
Rallus elegans

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5467	Breeding	Breeding Sighting-Confirmed	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5468	Breeding	Roosting Area	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5469	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5470	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5471	Breeding	Nest	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5472	Breeding	Foraging	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

There is very little information on the home ranges of king rails, so the models are based on a similar species, the clapper rail, for which many studies have been conducted. Clapper rail home ranges are widely reported in the literature and vary by study. Studies from Arizona, California and Louisiana report average breeding season home ranges between 0.40-6 ha (Eddleman 1988, Eddleman 1989, Zembal et al. 1989, and Sharp 1976). Other studies from South Carolina, Virginia and Louisiana report average breeding season home ranges between 31-487 m (Bland 1963, Conway, et al. 1993, Meanley 1985 and Roth et al. 1972). Additionally, males maintain slightly larger home ranges than females (Eddleman 1989). In New Jersey, a sixyear study revealed a nesting density of 1-1.16 per ha (Mangold 1974). NatureServe has set a minimum extent at 0.1-km (NatureServe 2006). We are accepting the NatureServe minimum inferred extent of 0.1 km until such time as that is changed or we have additional information, including New Jersey-specific data, to justify a change in this value.

Literature:

Bland. 1963. Renesting and multiple brooding studies of marked clapper rails. Proc. Ann. Conf. Southeast Game and Fish Commission 17: 60-68.

The range of values for the home range of clapper rails in South Carolina was 183-274 m.

Conway, et al. 1993. Seasonal changes in Yuma clapper rail vocalization rate and habitat use. Journal of Wildlife Management 56: 282-90.

The average movement per day (in meters) of the clapper rail varied throughout the year. In JanFeb, the average movement was 140 m (n=88). In Mar-Apr it was 155 m (n=151). In May-Jun it was 111m (n=495). In Aug-Oct it was 121 m (n+305). In Nov-Dec it was 161 m (n=57).

Eddleman, W.R. 1988. Conservation of North American Rallids. Wilson Bulletin 100: 458-475.

The average home range size of clapper rails in Arizona was 3-6 ha.

Eddleman, W.R. 1989. Biology of the Yuma clapper rail in the southwest United States and northwest Mexico. Final Report, Intra-Agency Agreement No. 4-AA-30-02060, US Bureau of Reclamation, Yuma Project Office, Yuma, Arizona.

In Arizona, the average home range for males was 24 ha + 15.7 ha SD (n=6) and 21 ha + 8.7 ha SD (n=8) in January and February. During incubation, the average home range for males was 3.6 ha + 2.8 ha SD (n=4) and 2.2 ha + 1.8 ha SD for females.

Eddleman, W.R., Conway, C.J. 1998. Clapper rails (Rallus longirostris). In the Birds of North America, No. 340 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

The volume for clapper rails presents a range of values for home range of 0.12-3.59 ha in Arizona.

Kozicky, E.L., F.W. Schmidt. 1949. Nesting habits of the clapper rail in New Jersey. Auk 66: 355-64.

If a barrier (such as vegetation) was present, the minimum distance between nests in New Jersey was 13 m. If no barrier was present, the minimum distance between nests was 23 m.

Mangold. 1974. Clapper rail studies. 1974 Final Report, USFWS Accelerated Research Program. Contract No. 14-16-0008-937. Trenton, NJ.

Density of clapper rails nesting in New Jersey ranged between 1-1.6 per ha during a six year study.

Meanley, B. 1985. The marsh hen: A natural history of the clapper rail of the Atlantic coast salt marsh. Tidewater Publishing. Centreville, MD.

The smallest territory observed for a clapper rail in Virginia was 0.1 ha.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

The inferred minimum extent of habitat use (when actual extent is unknown) is 0.1 km

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Roth, R.D., J.D. Newman, L.L. McNease.1972. The daily and seasonal behavior pattern of the clapper rail in the Louisiana coastal marshes. Proc. SE Assoc. Game Fish Commission. 26:136-59.

In December- February in Louisiana, the mean max. movement of clapper rails along canals was 154 + 37m SD to 487 + 467 SD. The mate of an incubating clapper rail was usually within 15 meters of the incubating bird (and therefore the nest).

Sharp. 1976. Predation and distribution of the clapper rail in a Louisiana salt marsh. MS Thesis, Louisiana State University, Baton Rouge, Louisiana.

In Louisiana the average breeding home range of clapper rails was 0.53 ha and the average daily home range was 0.44 ha (n=3).

Zembal, et al. 1989. Movements and activity patterns of light-footed clapper rails. Journal of Wildlife Management 53: 39-42.

The home range of clapper rails in California ranged from 0.4-1.7 ha. Individuals only used a small portion during a single day and the home range of adjacent individuals overlapped considerably.

Last researched by: Davis

Date researched: 7/1/2006

Aves

Least Bittern
Ixobrychus exilis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5473	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5474	Breeding	Roosting Area	175 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5475	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5476	Breeding	Foraging	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5477	Breeding	Breeding Sighting-Confirmed	175 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5478	Breeding	Nest	175 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Very little research has been conducted on this secretive marsh bird. One telemetry study in New York reported a mean home range for adults was 9.7 ha with a range of 1.8 ha - 35.7 ha. NatureServe does not suggest an inferred extent for this species. The New York Study appears to be the most relevant to New Jersey. A mean home range of 9.7 ha equates to a circle of radius 0.175km. We will use this value as an inferred extent until such time as we have additional information, including New Jersey-specific data, to justify a change in this value.

Literature:

Bogner, H.C., G.A. Baldassarre. 2002. Home range, movement and nesting of least bittern in western New York. Wilson Bulletin 114(3): 297-308.

A telemetry study in New York tracked 33 adults and 12 chicks. The mean home range of the adults was 9.7 ha, with a range of 1.8-35.7 ha (which depended on whether the birds used one or two breeding sites per season). The mean movement of the chicks was 13.4 m between capture and 23 days post-hatch and 29.4 m between 24-27 post-hatch.

Last researched by: Davis

Date researched: 7/1/2006

Aves

Least Flycatcher
Empidonax minimus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5479	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5482	Breeding	Breeding Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5484	Breeding	Breeding Sighting-Confirmed	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

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. The breeding occurrence area was chosen to incorporate post-fledging habitat, which will include the upper limit size of the breeding population territory cluster.

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. The breeding occurrence area was chosen to incorporate post-fledging habitat, which will include the upper limit size of the breeding population territory cluster.

Literature:

Tarof, S. and J. V. Briskie (2020). Least Flycatcher (Empidonax minimus), 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.leafly.01

Mean territory size at Queen's Biology Station in e. Ontario: 0.14 ± 0.01 ha (range 0.04-0.30 ha, n = 89 clustered males; Tarof et al. 2005); other areas of Ontario: 0.13 ± 0.10 ha (range 0.03-0.38, n = 10; Martin 1960); New Hampshire: 0.18 ± 0.01 ha (n = 59; Sherry 1979); Michigan: 0.07 ha (range 0.01-0.20, n = 33; Macqueen 1950). Rogers (Rogers 1985a) notes that overall territory generally exceeds that defended by territorial male, however, SAT found males defend entire territory aggressively. Size of territory decreases after laying (Davis 1959a).

Despite defense of exclusive territories, most territories are distributed in dense aggregations or clusters," leaving apparently adjacent suitable habitat unoccupied (Davis 1959a, Dellasala and Rabe 1987, Sherry and Holmes 1985, Tarof and Ratcliffe 2004, Tarof et al. 2005; Figure 5). Based on marked birds, clusters range from 2-30 territories in size (mean ± SE = 7.4 ± 1.44 territories/cluster, n = 21 clusters). In n.-central Minnesota using point counts of unmarked birds, densities ranged from 5-84 singing males/cluster (median = 24 males/cluster) (Perry and Andersen 2003). Mean forest habitat area occupied by clusters in e. Ontario: 1.1 ± 0.01 ha (range 0.28-4.2 ha) (Tarof et al.

2005); Michigan: 18.05 ± 3.38 ha (range 1.65-38.5 ha) (Dellasala and Rabe 1987).

In e. Ontario, inter-cluster distance averaged 1,244.6 ± 200.8 m (345.8 - 2, 402 m) (Tarof et al. 2005). Tarof et al. (Tarof et al. 2005) report that ~10% of males settle solitarily. Territory size of solitaries averages 0.29 ± 0.06 ha (range 0.11 - 0.43 ha, n = 5). Solitary males occur at distances of up to 2.1 km from conspecifics.

Young attain independence about 2-3 wk after fledging. Fledglings generally recaptured within 100 m of nest site until 10-14 d after leaving nest; thereafter gradually dispersing so that by 20-24 d post-fledging they are about 500 m from nest, and by 30-34 d > 800 m from nest.

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Least Tern
Sternula antillarum

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4952	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4953	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
4954	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4955	Breeding	Suspected Breeding Location	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4956	Breeding	Foraging	3 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4957	Breeding	Nesting Colony	71.25 Meter Buffer	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes

Justification:

Least terns nest primarily on Atlantic coast beaches in New Jersey, with the exception of a few inland nesting sites in areas such as abandoned sand mines and airports. In coastal colonies in Georgia, least terns foraged up to 4.9 km from colony locations (Tomkins 1959). In California, least terns in coastal colonies preferred foraging in the ocean as opposed to other non-ocean foraging options. In that study, 90-95% of the terns foraged within 1.6 km of the shoreline, and were never observed at distances of greater than 3.2 km (Atwood 1983). At interior sites, Schweitzer found that least terns would forage up to 12 km from nesting sites (Schweitzer 1994). The majority of observed least terns along the Missouri River foraged within 100-200m from nesting sites and the maximum sighting was 4.5 km away (Hill 1993). In some locations, least terns will nest on rooftops. At a rooftop nesting site in Mississippi, terns foraged up to 4.5 km away (Jackson 1994). NatureServe (2006) does not make any recommendations for inferred minimum extents.

Literature:

Atwood, J.L., D. E. Minsky 1983. Least Tern foraging ecology at three major California breeding colonies. West. Birds 14: 57-71.

Approximately 75% of surveyed least terns in coastal California colonies foraged in the ocean as opposed to other bodies of water. Approximately 90-95% of the birds feed within 1.6 km of the shoreline in water less than 18.2 meters in depth. They were rarely observed foraging between 1.6 - 3.2 km offshore and were never observed at greater distances than 3.2 km miles.

Hill, L.A. 1993b. Design of constructed islands for nesting interior Least Terns. Pp. 109-118 in Proceedings of the Missouri River and its tributaries: Piping Plover and Least Tern Symposium (K. F. Higgins and M. R. Brashier, eds.). South Dakota State Univ., Brookings, SD.

Least terns in interior areas forage primarily in 100-300 m from riverine nesting sites. However, they may forage in areas up to 4.5 km away.

J. A. Jackson 1994. Terns on tar beach. Natural History 103(7): 46-53.

Least terns foraged 4.5 km from rooftop nest sites in Mississippi.

Schweitzer, S.H. 1994. Abundance and conservation of endangered interior Least Terns nesting on salt flat habitat. Ph.D. diss., Oklahoma State Univ., Stillwater.

In response to localized abundance of suitable fish, terns foraged up to 12 km from inland salt flat colonies.

Tomkins, I.R. 1959. Life history notes on the Least Tern. Wilson Bulletin 71: 313-322.

Nesting least terns foraged up to 4.9 km away when carrying food to a colony in Georgia.

Last researched by: Davis

Date researched: 2/1/2007

Aves

Little Blue Heron
Egretta caerulea

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5485	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
5486	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5487	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5488	Breeding	Nesting Colony	71.25 Meter Buffer	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes
5489	Breeding	Roosting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5490	Breeding	Foraging	8.1 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes

Justification:

Nesting area is defined by the area the birds actually use, as these birds do not defend a territory except immediately around their individual nests. The boundaries of the colony are defined as much by social attraction phenomenon and by habitat suitability. Consequently there is now immediately apparent justification for buffering the mapped extent of a nesting area. Where the mapped extent of a colony was available it was used. Where the mapped extent was not available the default seconds precision circle was used around the recorded nesting location point.

ENSP reviewed the literature regarding commuting distance for colonial nesting long-legged wading birds which fairly consistently indicates that the importance of suitable foraging habitat decreases with the distance from the nesting area (e.g. Dowd and Flake 1985, Custer et al. 2004, Kelly et al 1993, Thompson 1978). This is not surprising considering the energy demands of long commutes and the fact that, all other things being equal, if suitable foraging habitat is randomly distributed within the possible foraging range, simple geometry would argue that availability would increase with the square of the distance from the colony. Consequently, a particular type of wetland or riparian habitat is more critical if it is located close to a nesting area than a similar area located near the edge of the energetically feasible foraging range from the colony. It would therefore be unjustifiable to use the maximum foraging distance figures to define all potential foraging habitat as critical foraging habitat for a particular nesting colony. Conversely, using an average foraging

distance figure may under-include suitable habitat by omitting some foraging areas that are important because they provide particularly rich and easily exploited feeding habitat. Further, research (Custer et al. 2004) indicates that longer commuting distances are more frequent during high-demand and demographically critical nestling rearing period. Where the literature on commuting distance includes several studies, there can be wide variability in the mean commuting distances between different studies. When such was the case, we either averaged the reported mean commuting distances or used the information from the study with a large sample size or from an area most ecologically similar to New Jersey. We then doubled this figure.

Research in North Carolina found that 84% of breeding long-legged waterbirds flew to foraging areas, which is why habitat outside the vicinity of the colony must be valued as crucial to the success of the colony (Custer and Osborn 1978).Foraging commuting distances for little blue herons are highly variable, likely due to factors such as prey availability and water depth and fluctuation (Rodgers and Smith 1995). This variability can be observed in the flowing studies. In Florida, the average commuting distance was found to be 10.2 km (Bancroft et al. 1990). In North Carolina, the average distance was 2.9 km (Custer and Osborn 1978). NatureServe recommends a minimum inferred extent of 3 km and justifies it by noting a low mean foraging range size for this group (NatureServe 2006). We apply a 13.1 km radius around a colony to protect foraging areas.

Literature:

Bancroft, G. T., S. D. Jewell, A. M. Strong. 1990. Foraging and nesting ecology of herons in the lower everglades relative to water conditions. Final report to South Fla. Water Manage. Dist., West Palm Beach, FL.

In Florida, the average commuting distance of little blue herons to foraging sites from a marsh island colony was 10.2 km.

Custer, C.M., S.A. Suarez, D.A. Olsen. 2004. Feeding habitat characteristics of the Great Blue Heron and Great Egret nesting along the Upper Mississippi River, 1995-1998. Waterbirds 27(4): 454-68.

The majority of the herons in this study fed <5 km from the nesting site, and avoided areas > 10 km away. They flew farther to sites during the brood-rearing period than during incubation. Only 10% of the feeding flights ended at a location where another heron was present, indicating that they prefer to feed alone.

Custer, T. W., R. G. Osborn. 1978. Feeding habitat use by colonially-breeding herons, egrets, and ibises in North Carolina. Auk 95: 733-743

In North Carolina, little blue herons commuted an average of 2.9 km from a coastal colony to foraging sites.

Dowd and Flake. 1985. Foraging habits and movements of nesting Great Blue Heron in prairie river ecosystem, South Dakota. Journal of Field ornithology 56: 377-87.

A study in South Dakota found that the average distance that great blues flew from their colony to a foraging site was 3.1 km, and the maximum observed distance was 24.4 km. Eighty-five percent of the herons in the study fed within 4 km of the colony.

Kelly J. P., H. M. Pratt, P. L. Greene. 1993. The distribution, reproductive success, and habitat characteristics of heron and egret breeding colonies in the San Francisco Bay area. Colonial Waterbirds. 16:18-27.

> 95% of great blue herons and >90% great egrets fed within 20 km of their colony.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 4, 2007).

The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 3 km. For the breeding season, this figure is based on a low mean foraging range size for this group.

Rodgers, J. A., Jr., and H. T. Smith. 1995. Little Blue Heron (Egretta caerulea). In The Birds of North America, No. 145 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Choice of foraging sites and length of time a particular area is used are highly variable, depending on prey available, water depth, and water-level fluctuation. Flight distance to foraging sites varies among studies, probably reflecting food availability.

Thompson. 1978. Feeding areas of Great Blue Herons and Great Egrets nesting in the floodplain of the upper Mississippi River. Proc. Colonial Waterbird Group. 2: 202-213.

In central Minnesota the average distance that the herons flew from the colony to a foraging area was 6.5 km, and the maximum observed was 20.4 km. Fifty-three percent of the herons in the study fed within 4 km of the colony.

Last researched by: Davis

Date researched: 1/1/2007

Aves

Loggerhead Shrike
Lanius ludovicianus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4795	Nonbreeding	Non-breeding Sighting	250 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Little is known about the occurrence of this species in New Jersey, but it is unlikely that this species breeds in New Jersey (Pruitt 2000). Elsewhere, territories ranged from 2.7 to 34 ha (Dechant et al. 1998, Yosef 1996). The occurrence area was chosen based upon the upper range of territory size.

Literature:

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, M. P. Nenneman, A. L. Zimmerman, and B. R. Euliss. 1998 (revised 2002). Effects of management practices on grassland birds: Loggerhead Shrike. Northern Prairie Wildlife Research Center, Jamestown, ND. 19 pages.

Territories 6-9 ha averaging 2.7 ha in Alberta to 25 ha in Idaho. Alberta ROW territories were 8.5 ha. Average Missouri territories were 4.6 ha.

Pruitt, L. 2000. Loggerhead Shrike Status Assessment. USFWS, Bloomington, IN.

This species has not been documented breeding in New Jersey since the early 1900s. It is a partial migrant only in northern part of range and migration may depend on severity of winter and food availability in breeding habitat during wintertime. Stopover sites are different in spring than fall and individuals may migrate between wintering sites.

Winter habitat is not different from breeding habitat. May move from pastures to more shrub-forest habitat in winter, particularly when snow-covered. Could also use more cropland in winter

Yosef, R. 1996. Loggerhead Shrike (Lanius ludovicianus). In The Birds of North America, No. 231 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and The American Ornithologists' Union, Washington, D.C.

Breeding territories averaged 13.4 ha in Alberta, 34 ha in California, 4.6 ha in Missouri, 7.5 ha in New York, 8.35 ha in Florida, and 8.9 ha and 25 ha in Idaho. No information on minimum patch size was provided. Breeding territories maintained year-round in Florida and S. Carolina, but not in California.

No information provided on migratory habitat - assume similar to breeding habitat. Winter habitat also similar to breeding habitat but hay fields and idle pastures used in addition to scrub-shrub and open forest habitat

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Long-eared Owl
Asio otus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4787	Nonbreeding	Non-breeding Sighting	400 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4790	Breeding	Breeding Sighting	400 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4792	Breeding	Nest	400 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4793	Nonbreeding	Roosting Area	400 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

No information was found regarding home range/territory sizes for long-eared owls in the northeast. Reported home ranges for this species are highly variable and range from 0.7 - 20.25 km2 (Kirschbaum and Ivory 1999). Craighead and Craighead (1956) reported home ranges for long-eared owls in Wyoming ranging from 34 - 106 ha with an average of 51 ha. Knight and Erickson (1977) estimated breeding densities along the Columbia River to be approximately 1 pair/12 linear km. Along the Snake River in Idaho an average of 0.28 - 0.42 nesting pairs per square km was estimated, as compared to areas in southern Idaho where from 0.64 - 1.55 pairs per square kilometer where found (Marks 1986). Due to the paucity of information on home range for long-eared owls, especially in the northeast, a conservative home range estimate of 50 ha has been adopted based on the available literature.

Literature:

Craighead, J.J., and F.C. Craighead, Jr. 1956. Hawks, owls and wildlife. Stackpole Books, Harrisburg, PA. 443pp.

Home ranges in Wyoming ranged from 34 - 106 ha with an average of 51 ha.

Kirschbaum, K.,and A. Ivory. 1999. Asio Otus (On-line) Animal Diversity Web. Accessed April 4, 2007 at http://animaldiversity,ummz.umich.edu/site/accounts/information/Asio_otus.html .

Reported that home ranges were highly variable and ranged from 0.7 - 20.25 square kilometers.

Knight, R.L., and A.W. Erickson. 1977. Ecological notes on long-eared and great horned owls along the Columbia River. Murrelet 58: 2-6.

Reported 1 pair per 12 linear kilometers of riparian habitat in Washington.

Marks, J. S., D. L. Evans, and D. W. Holt. 1994. Long-eared Owl (Asio otus). In The Birds of

North America, No. 133 (A. Poole and F. Gill, Eds.). Philadelphia: The Academy of Natural Sciences; Washington, D.C.: The American Ornithologists' Union.

Two breeding pairs were tracked for 8-9 nights and were found to use a core area within 1 km of the nest with occasional forays up to 3 km from the nest.

Marks, J.S. 1986. Nest site characteristics and reproductive success of long-eared owls (Asio otus) in southwestern Idaho. Wilson Bull. 98: 547-60.

Reported home ranges in Idaho along the Snake River ranging from 238 to 357 ha. Elsewhere in southeastern Idaho home ranges varied from 65 to 155 ha.

Last researched by: Valent

Date researched: 4/1/2007

Aves

Migratory Raptor Concentration Site
Raptor Winter Concentration Area

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7887	Nonbreeding	Non-breeding Concentration	Hand Digitized Polygon	Apply a buffer	Convert to a point and buffer	Stays as is	Yes

Justification:

Mapped polygons represent all non-urban habitat (2020 NJDEP LU/LC) in the lower 20 kilometers of the Cape May peninsula. Urban Area 2020 LUC was clipped out.

Literature:

Frank, C.A. 2007. A comparison study of migratory raptor distribution and habitat use at the Cape May peninsula stopover. M.S. Thesis, Rutgers University, New Brunswick, NJ. 77 pages.

N/A

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.

N/A

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.

N/A

Last researched by: Clark

Date researched: 7/02/2024

Aves

Nashville Warbler
Leiothlypis ruficapilla

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6539	Breeding	Breeding Sighting	90 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6541	Breeding	Breeding Sighting-Confirmed	90 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6542	Nonbreedi ng	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Little information is known about breeding territories of Nashville warblers, so the breeding occurrence area was chosen based on the upper limit breeding density calculated to a territory size of 2.5 ha (Williams 1996). The nonbreedingpopulation is listed as stable in NJ, so no occurrence area was chosen and will not be included in the Landscape Project.

Literature:

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.

Breeding territory in East: 5-15 pairs/40.5 ha in Vermont. In subalpine area in White Mtns. of New Hampshire, territory size 1.1 ha, with 9 pairs (± 3 SE)/km2; in nearby area of virgin spruce grove, density increased to 24 pairs/km2. During spruce-budworm outbreak in Maine and New Hampshire, territorial density >0.5 territories/ha.

Prefers second growth, open deciduous, or mixed-species forests, with high level of light penetration; preferably with shrubby undergrowth. Never found in unbroken forest. In New York, nests in mixed forests, edges, and fields. In the East, sometimes inhabits mountains slopes, including fairly steep ones, as high as 1,400 m, but not above timberline. Nests farther south are found in drier, more open, cut-over areas and in second-growth forests, especially with aspen, birch, and alder (Alnus).

During migration, frequents deciduous trees or shrubs in open mixed forests at mid-canopy level, bushy edges of woodlands along streams, roads, and paths, or edges of fields, meadows, and ponds, swamps, or marshes. Often seen in mixed-species flocks in both spring and fall migration.

Last researched by: Petzinger

Date researched: 9/30/2008

Aves

Northern Goshawk
Accipiter gentilis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4797	Breeding	Nest	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4798	Breeding	Breeding Sighting	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4800	Nonbreeding	Non-breeding Sighting	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Northern goshawks' home range sizes vary both seasonally and by sex. Males generally have larger territories than females, although there are exceptions, and both sexes have larger territories during the non-breeding season than during the breeding season (Squires and Reynolds 1997). Breeding habitats are more selective, the hawks preferring large, contiguous tracts of mature forests and forested wetlands (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). Results from research on home ranges sizes vary greatly and no home range size determination has been developed for eastern populations. However, due to the similarity in habitat preferences and behavior of northern goshawks and red-shouldered hawks in NJ and NY (Bosakowski and Speiser 1994), the same occurrence area will be used as a conservative estimate of northern goshawk critical habitat until new research suggests differently.

Literature:

Bosakowski, Thomas and Robert Speiser. 1994. Macrohabitat Selection by Nesting Northern Goshawks: Implications for Managing Eastern Forests. Studies in Avian Biology. 16:46-49.

Squires, J. R., and R. T. Reynolds. 1997. Northern Goshawk (Accipiter gentilis). In The Birds of North America, No. 298 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Home range studies varied in methodology and focused on western populations of northern goshawks: Arizona males' ranges varied from 1,758 ha + 500 (std. dev.) (range 896 - 2,528 ha). New Mexico males' ranges varied from 2,106 ha + 635 (std. dev.) (range 1,698 - 2,837 ha); New Mexico females' ranges varied from 569 ha + 473 (std. dev.) (range 95 - 1,292 ha). California males' ranges varied from 1,340 ha + 810 (std. dev.) (2 males, one with 1,790 ha range and 3,010 ha range). Northern California males' ranges varied from 2,425 ha (1,083 ha - 3,902 ha); Northern California females' ranges varied from 3,774 ha (2,007 - 6908 ha).

Last researched by: Schantz

Date researched: 1/1/2006

Aves

Northern Harrier
Circus hudsonius

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4805	Nonbreeding	Non-breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4806	Breeding	Breeding Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4808	Breeding	Nest	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from about 1 ha to over 1,500 ha (Dechant et al. 1998, MacWhirter and Bildstein 1996). The breeding occurrence area was chosen based upon evidence of large territories, the distance traveled for foraging, and the mobility of the species (Dechant et al. 1998). The non-breeding occurrence area was chosen based upon evidence of smaller territories (MacWhirter and Bildstein 1996) than breeding territories and the mobility of the species. No minimum patch size was chosen due to evidence that harriers will use smaller patches (Dechant et al. 1998).

Literature:

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.

In North Dakota, uncommon in areas < 100 ha. In Illinois, nested in grasslands 8-120 ha in size. May respond to total amount of grassland in area instead of patch size - small fragments may be used if located near larger patches. Missouri nesting density: 121 ha per pair. Male home ranges averaged 890 ha. In Manitoba males defended 27.7 ha centered on nest. In Minnesota traveled over 259 ha to hunt. Idaho territories averaged 1570 ha for males and 113 ha for females.

MacWhirter, R. B., and K. L. Bildstein. 1996. Northern Harrier (Circus cyaneus). In The Birds of North America, No. 210 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologists' Union, Washington, D.C.

Not very territorial except of the nest. In New Brunswick male breeding territories were 100 ha, female territories 10 ha. In Idaho, male territories were 0.8 ha. Nonbreeding territories were 65 ha in SE US, California ranged from 3.9 - 125 ha and a mean of 33.6 ha.

Last researched by: Petzinger

Date researched: 1/1/2006

Aves

Olive-sided Flycatcher
Contopus cooperi

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7241	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

This species only migrates through NJ. Not much is known about foraging distance of olive-sided flycatchers while migrating. Therefore, the default of 71.25 m will be used as the radius.

During migration, this species mainly uses “mountain habitats, although uses greater diversity of habitats during migration (substantially more riparian and nonconiferous habitats) than during the breeding season. Reported in spring migration in Arizona in heterogeneous deciduous riparian forest of sycamore (Platanus spp.), ash (Fraxinus spp.), and hackberry (Celtisspp.; Stevens et al. 1977). In Nevada, also a transient in riparian areas, particularly during spring migration (Alcorn 1988). Migrant birds in Mexico and n. Central America use pine-oak (Pinus spp. -Quercus spp.), evergreen, and semideciduous forests and edge (Howell and Webb 1995). In Honduras, where Olive-sided Flycatcher is considered an uncommon transient, occurs primarily in highlands from 600 to 1,600 m, although occasionally migrates through lowlands on both coasts, especially in fall (Monroe 1968). In Guatemala, uncommon transient in pine and oak woodland and woodland edge from 300 to 2,600 m (Land 1970). Uncommon to fairly common migrant in Costa Rica from lowlands to 2,500 m, and rarely to 3,050 m (Stiles and Skutch 1989). A fall migration stopover site in San José, Costa Rica, where 17 individuals were banded over 12-yr period, was characterized as second-growth scrubby woodland on an abandoned coffee plantation (Stiles 1994a).”

Literature:

Altman, B. and R. Sallabanks (2012). Olive-sided Flycatcher (Contopus cooperi), version 2.0. In The Birds of North America (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.502

Last researched by: Petzinger

Date researched: 12/24/2018

Aves

Peregrine Falcon
Falco peregrinus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4860	Breeding	Urban Nest	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4861	Breeding	Nest	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4863	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4865	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

All emergent wetland habitats within 1 km of a nest are 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. Prey species are mainly passerines, shorebirds and doves found in open habitats, usually within 1-5 km of the nest. Typical hunting habitats are emergent marsh, scrub-shrub, beach, dunes and intertidal flats. 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; Nadareski 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.

Literature:

Nadareski, C. A. 2001. Analysis of prey of the peregrine falcon (Falco peregrinus) for the Port of New York/New Jersey. Unpublished report to U.S. Fish and Wildlife Service. May 2001.

N/A

Steidl, R. J., C. R. Griffin, T. P. Augspurger, D. W. Sparks, L. J. Niles. 1997. Prey of peregrine falcons from the New Jersey coast and associated contaminant levels. Northeast Wildlife 52:11-19.

N/A

White, C. M., N. J. Clum, T. J. Cade, and W. G. Hunt. (2002). Peregrine Falcon (Falco peregrinus). The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Peregrine_Falcon/.

N/A

Last researched by:	Clark
Date researched:	2/1/2007

Aves

Pied-billed Grebe
Podilymbus podiceps

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4819	Breeding	Breeding Sighting-Confirmed	110 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4820	Breeding	Foraging	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4821	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4822	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4823	Breeding	Nest	110 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The average home range in one study was found to be 1.3 ha, although another study reports a home range as large as 35 ha (Glover 1953, Muller 1995). A similar species, the red-necked grebe, had a home range of 114 meters (Palmer 1962). Pied-billed grebes will defend a circular area with a radius of 46 m from the nest, but sometimes the radius will be smaller than this (Johnsgard 1987). NatureServe reports a minimum inferred extent of 0.11 km (NatureServe 2006). We are accepting the NatureServe minimum inferred extent of 0.11 km until such time as that is changed or we have additional information, including New Jersey-specific data, to justify a change in this value.

Literature:

Glover. 1953. Nesting ecology of the pied-billed grebe in northwestern Iowa. Wilson Bulletin 65: 32-39.

The average home range of pied-billed grebes in Iowa was 1.3 ha (n=44), which is roughly a circle with a diameter of 130 m.

Johnsgard. 1987. Diving birds of North America. University of Nebraska Press. Lincoln xii. 292 pp.

An area of a radius of 46 m around the nest is defended by pied-billed grebes, though it is sometimes smaller than this.

Muller. 1995. Pied-billed grebes nesting on Green Lake, Seattle Washington. Washington Birds 4:35-59.

Some pied-billed grebes had a home range as large as 35 ha.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

Inferred minimum extent is 0.11 km.

Palmer. 1962. Handbook of North American birds. Vol 1. Loons through flamingoes. R.S. (ed.). Yale University Press, New Haven. 567 pgs.

Red-necked grebes had a home range of approximately 114 meters.

Last researched by: Davis

Date researched: 7/1/2006

Aves

Piping Plover
Charadrius melodus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4941	Breeding	Nest	750 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4942	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4943	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4944	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4945	Breeding	Nesting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes

Justification:

Piping plovers nest singly or in loose colonies on the Atlantic coast beaches in New Jersey. They maintain a breeding territory that consists of a section of shoreline (for feeding) and a portion of beach (for nesting) (Whyte 1985). Males defend territories (pre-nest) of up to 10,000m2 (Cairns 1982). Home range during incubation is generally confined to the vicinity of the nest. Distances to nearest nest highly variable: averages include 50 m apart in Nova Scotia (Cairns 1977) to a range of 500m - 5000m in New York (Elias-Gerken 1994). In New Jersey, piping plover territories appear to be at least partially based on the amount of habitat available. Pairs with fewer conspecifics on the site tend to maintain larger territories, and pairs that are spaced at a higher density tend to have smaller territories (C. Kisiel, personal communication, February 23, 2007).

Piping plover chicks are precocial and therefore highly mobile (Cairns 1982). In NJ, broods have been documented traveling maximum distances of up to three-quarters of a mile (1207 meters) (T. Pover, personal communication, February 13, 2007). Chick mobility varies in other states: in Maryland and Virginia distances varied from 32m - 600+ meters (both studies n=59 broods) (Patterson 1988, Cross 1989). At another Maryland study, brood distances averaged 143m (n=87 broods), but three weeks post hatch increased to an average of 237m (n=80broods). In North Carolina, the average was 274.23m (n=14 broods) (Coutu, et al 1990).In Massachusetts, 50% the focal chicks moved >200m in the first 5 days post hatch (50% moved <100m) (n=10 chicks) (Strauss 1990).

In nesting areas outside NJ, territory size also varied by point in the nesting cycle and among sites: an average of 4,000 m2 in Nova Scotia (Cairns 1982) to 27,022 - 30,547 m2 in Saskatchewan (Whyte 1985). Natureserve recommends a buffer of 1.5 km when actual extent is unknown.

Literature:

A. J. Whyte. 1985. Breeding ecology of the Piping Plover (Charadrius melodus) in central

Saskatchewan. M.S. thesis, Univ. Saskatchewan, Saskatoon.

Birds primarily fed within 15 m of the shoreline on Big Quill Lake, Saskatchewan but also sometimes fed near nest. Pairs maintained a 27,022 - 30,547 m2 territory.

Coutu, S.D., J.D. Fraser, J.L. McConnaughy, and J.P. Loegering. 1990. Piping plover distribution and reproductive success on Cape Hatteras National Seashore. Unpublished report to the National Park Service. 67pp.

Observations of 11 broods averaged 2121m from their nests; 3 broods moved 400-725 m from their nest sites.

Cross,R.R. 1989. Monitoring, management and research of the piping plover at Chincoteague National Wildlife Refuge. Unpublished report. Virginia Department of Game and Inland Fisheries Virginia. 80pp.

At 3 sites, observers recorded broods at a mean distance from their nests of 153 m +/-97m (44 observations, 14 broods), 32m +/- 7m (8 observations, 3 broods), and 492m +/-281m (12 observations, 4 broods).

Elias S.P., J. D. Fraser, P. A. Buckley. 2000. Piping Plover brood foraging ecology on New York barrier islands. J. Wildl. Manage. 64: 346-354.

On ocean beaches wrack line is preferred foraging habitat for chicks followed by vegetated dunes.

Elias-Gerken, S.P. 1994. Piping plover habitat suitability on central Long island, New York barrier islands. M.S.Thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia, 48pp.

In New York in 1992, she observed 2.1 pairs/km on Westhampton Island, 1.8 pairs/km on Jones Island and 0.2 km/pair on Fire Island.

Haig, Susan M., and Elliott-Smith, E. (2004). Piping Plover. The Birds of North America Online. (A. Poole, Ed.) Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Piping_Plover/.

While percentage of feeding near the shoreline varies by sex, age, and stage of breeding, birds feed chiefly within 5 m of the water’s edge; only at sunset do parents and broods return to feed on higher ground. In Manitoba, individual breeders seen throughout the breeding season at sites that ranged from 3-102 km apart.

J. Whyte. 1985. Breeding ecology of the Piping Plover (Charadrius melodus) in central Saskatchewan. M.S. thesis, Univ. Saskatchewan, Saskatoon.

Describes piping plover nesting habitat requirements.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

The inferred minimum extent habitat use (when actual extent is unknown) is 1.5 km (diameter).

Patterson, M.E. 1988. piping plover breeding biology and reproductive success on Assateague Island. M.S. thesis. Virginia Polytechnic Institute and State University, Blacksburg, Virginia. 131 pp.

Eighteen of 38 broods moved to feeding areas 100+m from nest, 5 broods moved 600+m. The distances were measured parallel to the wrack line.

Strauss,E. 1990. Reproductive success, life history patterns and behavioral variation in a population of piping plovers subjected to human disturbance (1982-1989). Ph.D. dissertation. Tufts University, Medford, Massachusetts. 143pp.

Ten chicks moved more than 200m during the first 5 days post-hatch while 19 chicks moved less than 200m during the same interval.

W. E. Cairns. 1977. Breeding biology and behavior of the piping plover Charadrius melodus in southern Nova Scotia. M.S. Thesis. Dalhousie University, Halifax, Nova Scotia. 115pp.

Pairs nested, on average, 50m apart at this Nova Scotia study site. The shortest observed distance between two nests was 3 m.

W. E. Cairns. 1982. Biology and behavior of breeding Piping Plovers. Wilson Bull.94: 531-545.

Males run distances of up to 100m during parallel run displays in pre-nesting territory disputes. Pairs maintained an average of a 4,000m2 territory.

Last researched by: Davis

Date researched: 2/1/2007

Aves

Prairie Warbler
Setophaga discolor

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5533	Breeding	Breeding Sighting-Confirmed	710 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5534	Breeding	Breeding Sighting	710 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5535	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Breeding territories are small, but adults will travel outside the territory and/or travel to establish new territories and fledglings are also highly mobile soon after leaving the nest. Based on this information the breeding occurrence area reflects the average distance breeding adults will move outside of its territory.

Non-breeding individuals are listed as stable in NJ so the default occurrence area was chosen and will not be included in the Landscape Project.

Literature:

Nolan Jr, V., E. D. Ketterson, and C. A. Buerkle (2020). Prairie Warbler (Setophaga discolor), 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.prawar.01

Male defends type-A (i.e., large, all-purpose) territory (2 disjunct territories rarely). Territory size (years pooled) on 2 nearly adjacent Indiana tracts that differed in age and structure of vegetation (Nolan 1978: 331-337): younger successional stage, 0.5-3.5 ha (mean 1.62 ± 0.72 SD, n = 111); older (more and larger trees), 0.4-2.4 ha (mean 1.47 ± 0.47 SD, n = 60). Mean annual size in Indiana varied inversely with population density. Smallest sizes reported in literature: mean 0.47 ha (85 pairs/40 ha tract in Maryland), 0.24 ha on island in Georgia (Nolan 1978: 332; see also Nolan 1978: Table 1). Territories of young males were smaller. Shape correlated with size in Indiana: Territories smallest when roughly square (compact), intermediate when oblong, largest when very elongated. Territories adjoining unsuitable habitat (where defense is thus unnecessary) were larger.
Males often leave the territory ("explore"; maximum observed distance, 1.2 km; Nolan 1978: Chapter 30); Explorations may lead to acquisition of temporary or new permanent territory (Nolan 1978: 341). Males have traveled 10-3,400 m (mean 710, n = 12) to establish new territories.

Fledglings are independent at 34-55 days old (mean 40.8 ± 4.6 SD, n = 50 family units). About 2 h after fledging, young are scattered about 30 m from nest. If nest is in the open, young move gradually toward tree row or edge of woods.

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Purple Martin
Progne subis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5713	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5716	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5718	Breeding	Breeding Sighting-Confirmed	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Not much is known about foraging distance of purple martins while breeding, but it is thought that they forage around the nest. Therefore, the default of 71.25 m will be used as the radius.

Pair formation “coincides usually with establishment of nest-cavity ownership by both sexes. Since females usually arrive at breeding sites later than adult males, some territorial males who control nest cavities remain unpaired for up to 3 wk after their arrival (CRB). In n. Texas, most adults have formed pairs by mid- to late Apr and most yearlings by mid- to late May; the latest a pair became established was 5 Jun (CRB). For representative arrival dates, see Migration: timing and routes of migration, above. Birds of both sexes probably spend several days to a week or more investigating nest sites after arrival and before becoming firmly established at a site or choosing a mate.

In s. U.S., nest building may not begin until several weeks after pair formation; the delay is probably a consequence of early spring arrival (Allen and Nice 1952, Rohwer and Niles 1977, Brown 1978g). In n. Texas, nests seldom started before 15 Mar and usually not before 25 Mar (CRB); in Michigan, nest-building begins 2–7 May (Allen and Nice 1952). Interval between arrival and nest-building declines later in spring, and some yearlings begin nest-building 1–2 d after establishing nest-site ownership (CRB). Time taken to build nest varies depending on when in the season a pair becomes established. In n. Texas, earlier-arriving pairs spend up to 4 wk building nest before laying first egg; later pairs spend as little as 10 d (CRB).

Usually single-brooded, although produces replacement clutch if nest fails in early part of breeding season. Egg-laying recorded as early as 26 Mar in Florida (Bent 1942b), 6 Apr (modal dates 22 Apr, 1 May) in n. Texas (CRB), 20 Apr in Alabama (Imhof 1976), 3 May in Baja California (Bent 1942b) and Virginia (Forbush 1929), 8 May in Oklahoma (Baumgartner and Baumgartner 1992), 11 May (modal date 5 Jun) in Kansas (Johnston 1964c), 12 May (modal date 9 Jun) in Pennsylvania (Hill 1995a), 15–26 May in Oregon (Gabrielson and Jewett 1940), 28 May (modal dates 19–20 Jun) in Alberta (Finlay 1971a), and approximately 10 Jun in Canadian Maritime Provinces (Erskine 1992a). Latest first-clutch initiation dates are 20 Jun in n. Texas (CRB) and Kansas (Johnston 1964c), 8 Jul in Alberta (Finlay 1971a), 15 Jul in Illinois (Graber et al. 1972) and Maritimes (Erskine 1992a), 17 Jul in Pennsylvania (Hill 1995a), and 10 Aug in Maryland (K. Klimkiewicz pers. comm.).

Before egg-laying begins and after nestlings fledge, birds feed throughout the day in long bursts and may spend the entire afternoon away from nest sites. After egg-laying begins, birds feed in more frequent and shorter bursts and are not absent from the colony for prolonged periods at any time of day. Nonbreeding and postbreeding birds range up to at least 48 km from late-summer roosts while foraging during the day (Brown and Wolfe III 1978). Nothing is known about foraging behavior during winter.

Aerial, often at altitudes of at least 50 m. Feeds higher than other swallows, sometimes to 150 m (Johnston and Hardy 1962, CRB). Because of these heights, foraging individuals are seen relatively infrequently, except in late afternoons and near dusk, when birds feed low and close to nest sites. Birds presumably range over areas immediately surrounding the nest site, although there is no information on typical travel distance while foraging. In Illinois, foraging birds preferred fallow fields (about 4 birds/40 ha), followed in descending order by shrub areas, oat fields, soybean fields, alfalfa fields, and cornfields (Graber et al. 1972). Cold, rainy weather in spring forces individuals, especially migrants, to feed low over ponds and lakes, apparently in pursuit of aquatic insects along water surface (CRB).

Eastern populations historically inhabited forest edge and riparian areas containing dead snags with woodpecker holes. Wooded ponds and beaver (Castor canadensis) marshes were probably often favored, but distribution was likely patchy and localized. With conversion to nesting in birdhouses, eastern martins now are found almost exclusively in cities, towns, or around human settlements. Birds seem willing to occupy very urban environments, sometimes nesting in downtown districts of large cities. Opportunistic within eastern range, going wherever birdhouses may be installed, and seem not to cue on general habitat features per se. They appear, however, to avoid the higher elevations of the Appalachians (Robinson 1990a)."

Literature:

Brown, C. R. and S. Tarof (2013). Purple Martin (Progne subis), version 2.0. In The Birds of North America (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.287

Last researched by: Petzinger

Date researched: 12/14/2018

Aves

Red Knot
Calidris canutus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4996	Nonbreeding	Non-breeding Sighting	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

During northbound spring migration (late-April to early June), shorebirds gather in large numbers to forage on horseshoe crab eggs and roost on Delaware Bay and Atlantic Coast beaches and marshes (Clark et al. 1993, Burger et al. 1997, Niles et al. 2008). During fall migration, large numbers of shorebirds concentrate on Atlantic Coast beaches and mudflat sites to build weight for southward migration (Niles et al. 2011), or remain for longer durations (2 - 6 months) to molt flight feathers (ENSP unpub. Data) and/or overwinter. Polygons delineate the extent of coastal areas where ENSP has documented shorebirds congregating to forage, roost and rest. Species occurrence areas for red knot were either recorded as a point location to identify where an individual or flock occurred or were digitized as polygons to reflect the area where flocks have been repatedly observed. Current aerial photography was used in delineating the SOA using the presence of important features such as mudflats and beaches to guide delineation. Areas delineated as polygons and those delineated as points both received a 100 m buffer to account for the dynamic changes that occur to mudflats and beaches.

Literature:

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.

N/A

Clark, K. E., L. J. Niles, and J. Burger. 1993. Abundance and distribution of migratory shorebirds in Delaware Bay, NJ. Condor 95:694-705.

Niles, L. J., H. P. Sitters, A. D. Dey, P. W. Atkinson, A. J. Baker, K. A. Bennett, R. Carmona, K. E. Clark, N. A. Clark, C. Espoz, P. M. Gonzalez, B. A. Harrington, D. E. Hernandez, K. S. Kalasz, R. G. Lathrop, R. N. Matus, C. D. T. Minton, R. I. G. Morrison, M. K. Peck, W. Pitts, R. A. Robinson, and I. L. Serrano. 2008. Status of the Red Knot (Calidris canutus rufa) in the Western Hemisphere. Studies in Avian Biology, No. 36. Cooper Ornithological Society.

Niles, L. J., J. Burger, R. R. Porter, A. D. Dey, C. D. T. Minton, P. M. Gonzalez, A. J. Baker, J. W. Fox and C. Gordon. 2010. First results using light level geolocators to track Red Knots in the Western Hemisphere show rapid and long intercontinental flights and new details of migration pathways. Wader Study Group Bull. 117(2):123-130.

Last researched by:	Pitts
Date researched:	3/4/2024

Aves

Red-headed Woodpecker
Melanerpes erythrocephalus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4824	Nonbreeding	Non-breeding Sighting	75 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4827	Breeding	Breeding Sighting-Confirmed	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4828	Breeding	Breeding Sighting	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 3.1 - 8.5 ha while wintering territories range from 0.05 - 1 ha (Smith et al. 2000). The breeding occurrence area was chosen based upon the upper limit breeding territory size of 7 ha. The non-breeding occurrence area was based upon the upper limit wintering territory size of 0.6 ha and increased because this species will travel beyond its territory to forage (Smith et al. 2000).

Literature:

Smith, K. G., J. H. Withgott, and P. G. Rodewald. 2000. Red-headed Woodpecker (Melanerpes erythrocephalus). In The Birds of North America, No. 518 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Little is known about breeding territories. In Florida, size of summer territories (3.1-8.5 ha) larger than in winter, with overlap between adjacent territories, although overlap areas not used as much as exclusive portion

Little information on habitat use in migration. Forages on living oak, maple (Acer), and hickory (Carya) trees and dead trees during spring in Illinois. Uses shelterbelts in spring migration on Great Plains. Forms loose flocks in fall in Florida that seek mast or fruit-bearing trees in orchards, oak hammocks, and urban areas where mature oaks or fruit trees are plentiful. Some suggest that species use forest edges more in fall.

Winter habitat in north, found in mature stands of forest, particularly oak forests; oak-hickory, maple, ash (Fraxinus), or beech woodlands; and old oak woodlots containing overmature trees with many cavities and dead. In south, pine and pine-oak areas. Favors areas with numerous standing snags (dri-ki) resulting from flooding or girdling by beavers, beaver ponds, marshes, and swamps. Also favored elm trees that had succumbed to fungal Dutch elm disease. Presence of mast as a winter food has long been recognized as single most important factor determining winter distribution in northern part of range, leading to the rule, "No mast, no redheads". A positive relationship existed between numbers and acorn abundance in most counties studied in Missouri and large acorn-bearing oaks in Illinois, suggesting that species may respond to acorn abundance on a local scale, but this relationship remains unstudied.

Winter territories can be small; e.g., 0.05 ha ± 0.03 SD (n = 8) for adults and 0.03 ha ± 0.03 (n = 6) for juveniles, but more typically 0.17 ha ± 0.04 SE (n = 20) to 0.38 ha ±0.04 (n = 18), to 0.5-0.6 ha to as large as 1 ha.). Acorns often gathered from beyond territory, and several individuals may be seen gathering acorns at same source, such that individuals defend their storage sites, not source of acorns.

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Red-shouldered hawk
Buteo lineatus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4830	Breeding	Nest	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4831	Breeding	Breeding Sighting	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4836	Nonbreeding	Non-breeding Sighting	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

According to the scientific literature home range sizes for eastern populations of red-shouldered hawks' are highly variable, both seasonally and by sex. Males generally have larger territories than females and both sexes have larger territories during the non-breeding season than during the breeding season (Crocoll 1994). Crocoll, 1994, reported that the average breeding season home range of eastern populations varied from 108.9 ha to 339 ha. The mean breeding season home range being 224 ha, an area equivalent to a circle having a 0.71 km radius. ENSP selected a slightly larger occurrence area boundary for red-shouldered hawks to account for the larger territory size used by the birds during the non-breeding season.

Literature:

Crocoll, S.T. Red-shouldered hawk. The Birds of North America, No. 107, 1994. The Academy of Natural Sciences, Philadelphia.

Home range of red-shouldered hawk varies from 108.9 ha to 339 ha in eastern populations during the breeding season, with a computed average of 224 ha.

Last researched by: Schantz

Date researched: 1/1/2006

Aves

Roseate Tern
Sterna dougallii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4877	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4878	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4879	Breeding	Foraging	3 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4880	Breeding	Nesting Colony	50 meter radii around nest/colony	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes
4881	Breeding	Suspected Breeding Location	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4882	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No

Justification:

Where the literature on commuting distance includes several studies, there can be wide variability in the mean commuting distances between different studies. When such was the case, we either averaged the reported mean commuting distances or used the information from the study with a large sample size or from an area most ecologically similar to New Jersey. We then doubled this figure.

The Birds of North America reports that there is inadequate data concerning commuting distances for roseate terns (Gochfeld et al. 1998). The information that is available varies widely. In Massachusetts, many roseate terns were observed to forage within 300 m of the colony (Gochfeld et al. 1998). In Puerto Rico, most terns fed within 2 km of the colony and often within 200 m (Shealer and Burger 1995). Other reports indicate that terns feed at maximum distances of 16- 30 km from nesting colonies (Gochfeld et al. 1998, Heinemann 1992, Nisbet and Spendalow 1999). NatureServe recommends a minimum inferred extent of 2 km, noting that this is a conservative estimate (NatureServe 2006). We apply a 4.8 km buffer around the colony to protect foraging areas.

Literature:

Gochfeld, M., J. Burger, and I. C. T. Nisbet. 1998. Roseate Tern (Sterna dougallii). In The Birds of North America, No. 370 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

BNA reports that inadequate information exists for commuting distances of roseate terns. They report that roseate terns may forage up to 30 km from breeding colonies. In Massachusetts, many terns foraged within 300m of the colony.

Heinemann, D. 1992. Foraging ecology of roseate terns breeding on Bird Island, Buzzards Bay, Massachusetts. Report to USFWS, Newton Corner, MA. 54 pp.

In Massachusetts, researchers observed foraging flights up to 16km.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 12, 2007)

The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 2 km. The authors note that this is a conservative estimate.

Nisbet, I.C.T., Spendalow, J.A. 1999. Contribution to research to management and recovery of the Roseate Tern: review of a twelve-year project. Waterbirds 22(2): 239-252.

During this twelve year study, authors report foraging commutes up to 25 km away.

Shealer D.A., J. Burger 1995. Comparative foraging success between adult and one-year-old Roseate and Sandwich Terns. Colonial Waterbirds 18: 93-99.

At Culebra and other Puerto Rican islands, roseate terns fed primarily within 2 km of colony, and often within 200 m.

Last researched by: Davis

Date researched: 1/1/2007

Aves

Rose-breasted Grosbeak
Pheucticus ludovicianus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5573	Breeding	Breeding Sighting	60 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5574	Nonbreeding	Non-breeding Sighting	60 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5577	Breeding	Breeding Sighting-Confirmed	60 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The upper CI of territory size is 1.2 ha. Therefore, a buffer radius of 60 m will be applied to breeding populations.

“Territory size in Tompkins Co., NY, ranged from 0.34 to 1.3 ha, averaging 0.77 ha (n = 20); territories seldom overlapped (Dunham 1966c).

Wide variety of habitats, including deciduous and mixed wooded uplands and lowlands; often at shrubby ecotones at the edge of woods at streams, ponds, marshes, roads, or pastures. Also commonly uses second-growth woodlands and well-vegetated suburban areas, parks, gardens, and orchards. Exhibits a preference for mesic woodlands, swamp forests, riparian corridors; avoids dry oak (Quercus spp.) woodlands (Peterjohn and Rice 1991, Veit and Petersen 1993)… In Appalachian Mtns., more likely to occur in general landscape than in old-growth forest (Haney 1999). Not considered an area-sensitive species; does not appear to be adversely affected by forest fragmentation.”

Literature:

Wyatt, V. E. and C. M. Francis (2002). Rose-breasted Grosbeak (Pheucticus ludovicianus), version 2.0. In The Birds of North America (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA.https://doi.org/10.2173/bna.692

Last researched by: Petzinger

Date researched: 12/26/2018

Aves

Ruddy Turnstone
Arenaria interpres

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6680	Nonbreeding	Non-breeding Sighting	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

During northbound spring migration (late-April to early June), shorebirds gather in large numbers to forage on horseshoe crab eggs and roost on Delaware Bay and Atlantic Coast beaches and marshes (Clark et al. 1993, Burger et al. 1997, Niles et al. 2008). During fall migration, large numbers of shorebirds concentrate on Atlantic Coast beaches and mudflat sites to build weight for southward migration (Niles et al. 2011), or remain for longer durations (2 - 6 months) to molt flight feathers (ENSP unpub. Data) and/or overwinter. Polygons delineate the extent of coastal areas where ENSP has documented shorebirds congregating to forage, roost and rest. Species occurrence areas for ruddy turnstone were either recorded as a point location to identify where an individual or flock occurred or were digitized as polygons to reflect the area where flocks have been repeatedly observed. Current aerial photography was used in delineating the SOA using the presence of important features such as mudflats and beaches to guide delineation. Areas delineated as polygons and those delineated as points both received a 100 m buffer to account for the dynamic changes that occur to mudflats and beaches.

Literature:

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.

Clark, K. E., L. J. Niles, and J. Burger. 1993. Abundance and distribution of migratory shorebirds in Delaware Bay, NJ. Condor 95:694-705.

Last researched by: Pitts

Date researched: 3/4/2024

Aves

Rusty Blackbird
Euphagus carolinus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8603	Nonbreeding	Migration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8604	Nonbreeding	Winter Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8605	Nonbreeding	Winter Roost	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

This species migrates and winters in NJ. Not much is known about foraging distance of rusty blackbirds while migrating. Therefore, the default of 71.25 m will be used as the radius.
During migration: "Often joins mixed flocks with other blackbird species (Todd 1940, Sprunt 1970, Robbins 1991), but also flocks as a single species, with flocks sometimes exceeding 1,000 birds (Robinson 1990a, Robbins 1991). Historically, spring migration was characterized as "spectacular, noisy, and ubiquitous" (Bent 1958: 283). Large numbers pass through a region relatively quickly. When flushed from a field, a feeding flock often lights in tops of trees, all birds facing the same direction, calling noisily (Beal 1900).
In late summer, after the breeding season, mixed-age flocks begin to form, and southward movements begin in September. Fall migrants associate with other blackbird species; also with American Robins (Turdus migratorius) and Blue Jays (Cyanocitta cristata) (Brewester 1906). No information to suggest segregation of age/sex classes in migration.
Forages in stubble, pasture, plowed fields, and edges of swamps. Fall migrants also frequent wooded areas, particularly for roosting (Brewester 1906, Bent 1958). Occasionally roosts on the ground in open fields (A. R. Stickley pers. comm.), sometimes with Red-winged Blackbirds (Bohlen 1989)."
During the winter: "Feeds mostly on the ground, particularly along edges of ponds, streams, and other wetlands. Also in open pasture, agricultural fields, and feedlots. In winter, sometimes feeds in trees on pine seeds, fruits, and berries (Meanley 1995).

Swamps, wet woodlands, and pond edges, usually not associated with other blackbirds (Rosenberg et al. 1991, Luscier et al. 2010, Greenberg et al. 2011). In S. Carolina, cypress (Toxodium) lagoons, stream and pond borders, and adjacent fields (Sprunt 1970). Cedar (Juniperus) thickets fringing open marsh, and swampy woodlands; small flocks feed in open fields, often near marshland (Burleigh 1958). Hardwood bottomlands in Arkansas, usually in small groups along creeks (Meanley 1972, R. A. Dolbeer pers. comm.). Occurs at all heights in wooded habitat, but stays mostly near the ground (Dickson and Noble 1978).
In British Columbia, on the southern mainland coast, found feeding in agricultural (stubble) fields, livestock feedlots, and sewage lagoons, often in flocks with other blackbirds (Red-winged and Brewers) and European Starlings (Campbell et al. 2001).
Luscier et al. (2010) quantified habitat use of wintering RUBL in the lower Mississippi Alluvial Valley (Arkansas, Louisiana). Although the species was generally found in forested wetlands, it was not as specialized in habitat use as expected. Percent canopy cover and tree density explained some of the variation in habitat use, but by no means all. Further research is needed to determine whether this lack of habitat specificity is widespread and possibly the result of diverse food requirements during the non-breeding season.

Literature:

Avery, M. L. (2013). Rusty Blackbird (Euphagus carolinus), version 2.0. In The Birds of North America (A. F. Poole, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bna.200

Last researched by: Petzinger

Date researched: 12/24/2018

Aves

Saltmarsh Sparrow
Ammospiza caudacuta

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5579	Breeding	Urban Nest	1400 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5580	Breeding	Breeding Sighting	1400 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5585	Nonbreeding	Non-breeding Sighting	300 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5586	Breeding	Nest	1400 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The upper limit of the larger home range for saltmarsh sparrows is about 60 ha. In addition to a large home range size, breeding adults will travel 2-3 km from the nest, and males will shift home ranges during the breeding season up to 1.4 km away from the nest (Greenlaw et al. 2020). Based on this information, the breeding occurrence area for this species is 1.4km to account for the high mobility of the species and shifting home ranges.

There is little information on non-breeding home range sizes but they are known to travel far to roost, especially during high tide, and travel between roost sites (Greenlaw et al. 2020). Based on this information, the non-breeding occurrence area for this species is 300m to account for the high mobility of the species.

Literature:

Greenlaw, J. S., C. S. Elphick, W. Post, and J. D. Rising (2020). Saltmarsh Sparrow (Ammospiza caudacuta), 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.sstspa.01

Saltmarsh Sparrows are non-territorial and localize their daily activities in large, overlapping home ranges (10, 163, 166, 49, 114, 116, 121). Home range sizes have been estimated by mapping locations of color-banded individuals and by radiotelemetry. Based on maximum area polygons, male home ranges in New Jersey were between 1.2 and 1.6 ha (10). New York male home range size averaged 4.3 ha, ranging from 3.0 to 5.7 ha 150). Based on radiotelemetry in Maine, Shriver et al. (116) found male home ranges averaged 52.9 ha, while female home range was 27.8 ha. Population density of males in New York averaged 45 males per ha in 1976–1980 (150). Based on a study of food resources in New York (141), it is probable that small home range sizes there compared to those in Maine are primarily related to differences in population density and in food resource availability. In Maine, males' core area comprised 42% of their home range, compared with 35% in New York. Some males in both Maine and New York used 2 core areas in their home ranges during a single season. In Maine, each core area was associated with different spring tidal cycles (116), while in New York, the shift was seasonal and unrelated to tides. In Connecticut, distances between the banding site of males and nests where the male was known to have fertilized eggs varied from within 1 ha to as far as 1.4 km away. The distances covered by males represent those fathering chicks within a core area containing both the banding site and nest or apparent shifts to new home ranges over 1 km away, which was close to the longest possible distance a male could be in the same marsh among those sampled.

Saltmarsh Sparrow home range sizes during breeding season are considerably larger than those reported for other sparrow species, likely due to lack of territorial behavior. Home ranges for both sexes overlap extensively (114, 116). Average core areas (9.6 ha ± 1.7 SE) and home ranges (52.9 ha ± 8.7 SE) of males larger than those for females (5.3 ha ± 1.4 SE and 27.8 ha ± 6.3 SE, respectively) during breeding season at Scarborough Marsh, Maine (n = 77 radio-marked birds). Core areas in coastal New York, based on intensive, marsh wide mapping of point locations of marked birds, were mean of 4.3 ha (range 3.0-5.7) for males and 1.1 ha (0.4-3.1) for females in largely low marsh habitat with high population density. For those individuals that maintained two core areas within a season in Maine, the distance between core areas was 159 m (± 18) for males and 78 m (± 13) for females. Female home ranges in Connecticut marshes during the 2-3 weeks after young fledge much smaller, as birds stay close to nest (mean: 0.51 m, min-max: 0.14-1.06 ha; n = 23 radio-marked birds; 122). Occasional movements of 2-3 km and back during breeding season (SHARP, unpublished data).

During post-fledging period, telemetered females generally stay within 100 m of nest, suggesting chicks also stay within this area, at least until independent (122).

Little information on home range sizes during nonbreeding periods, although birds seemingly travel moderately long distances (perhaps km) to roost on elevated marsh islands during high tides. They sometimes commute 200-300 m daily between roost sites.

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Sanderling
Calidris alba

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5587	Nonbreeding	Non-breeding Sighting	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. For many species that value habitat patches in the Landscape Project maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. Areas delineated as polygons and those delineated as points both received a 100 m buffer to account for the dynamic changes that occur to mudflats and beaches.

Literature:

N/A

N/A

Last researched by: Pitts

Date researched: 3/4/2024

Aves

Savannah Sparrow
Passerculus sandwichensis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4839	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4840	Breeding	Breeding Sighting-Confirmed	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4843	Breeding	Breeding Sighting	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 0.05 - 1.25 ha (Swanson 1998, Wheelwright and Rising 1993). The breeding occurrence area was selected based upon the upper limit of the territory range and increased to accommodate shifting territories for second nesting attempts and nomadic behavior of juveniles (Wheelwright and Rising 1993). No minimum patch size was selected based upon evidence that the species can occupy areas < 2 ha (Swanson 1998). Non-breeding savannah sparrows are not listed in New Jersey so no non-breeding occurrence area was assigned.

Literature:

Mitchell, L. R., C. R. Smith and R. A. Malecki, R. A. 2000. Ecology of grassland breeding birds in the northeastern US - a literature review with recommendations for management. USGS, BRD, NY Cooperative Fish and Wildlife Research Unit, DNR, Cornell University, Ithaca, NY 14853-3011. September 2000.

Maine had 50% incidence at 10 ha and that 5-10 ha is minimum size for birds to breed (see Vickery et al. 1994 below). New York had minimum area of 11.7 ha and mean patch size of 53.6 ha. Another study in New York had 97% incidence in areas 20 ha and larger, 88% incidence in 10-20 ha patches, 63% incidence in 5-10 ha patches, and 28% incidence in 3-5 ha patches. Missouri had minimum areas of 1-10 ha, and Illinois 10-30 ha.

Swanson, D. A. 1998 (revised 2002). Effects of management practice on grassland birds: Savannah Sparrow. Northern Prairie Wildlife Research Center, Jamestown, ND. 30 pages.

Territories range from 0.05 - 1.25 ha and they may occupy areas < 5 ha in size. In Illinois, none occurred in areas < 10 ha and 50% incidence at 40 ha.

Vickery, P. D., M. L. Hunter, Jr. and S. M. Melvin. 1994. Effects of habitat area on the distribution of grassland birds in Maine. Conservation Biology 8(4): 1087-1097.

In Maine, 50% incidence for SAVS was reached at 10 ha.

Wheelwright, N. T. and J. D. Rising. 1993. Savannah Sparrow (Passerculus sandwichensis).

In The Birds of North America, No. 45 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Breeding territories vary in size between regions, habitats, seasons, and years. Mean size or range: Michigan, 0.11 ha, Wisconsin, 0.53 - 0.86 ha, coastal Nova Scotia, 0.17 ha, Kent Is., NB, 0.05 - 0.30 ha (NTW); Sable Is., NS 0.38 - 0.53 ha in densely vegetated habitat, 1.09 - 1.25 ha in sparse habitat. Territory diameter 60 m in Quebec. Territories tend to expand during the breeding season and females will renest 0.5 - 31 meters from original nest (19m upper conf. limit), 26.7 m in Michigan, range from 7 - 42 m in Nova Scotia. Females are also territorial and are aggressive up to 20 m from nest. Parents will drop fecal sacs 10 - 50 m away from nest. Juveniles form loose flocks after a month post-fledging and wander 500 - 1000 meters daily while foraging.

Stopover habitat includes open fields, roadsides, dune vegetation, coastal marshes, edges of sewage ponds and other ponds in open country; rarely found in open woodlands. Winter habitat includes cultivated fields, pastures, golf courses, roadsides, dumps, dune grass, and salt marshes. P. s. rostratus and apparently other salt marsh populations, though generally wintering in salt marshes, can be found in a variety of open habitats, including sparsely vegetated habitats on xeric islands.

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Sedge Wren
Cistothorus stellaris

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4970	Breeding	Breeding Sighting	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4973	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4976	Breeding	Nest	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 0.12 to 3.4 ha and average 3.4 ha in Illinois (Dechant et al. 1998, Herkert et al. 2001). The breeding occurrence area was chosen based upon the average territory size in Illinois and increased to account for shifting territories (Herkert et al 2001). Little is known about the non-breeding territories, so the default occurrence area was chosen for migrant and wintering individuals.

Literature:

Dechant, J. A., M. L. Sondreal, D. H. Johnson, L. D. Igl, C. M. Goldade, B. D. Parkin, and B. R. Euliss. 1998 (revised 2002). Effects of management practice on grassland birds: Sedge Wren. Northern Prairie Wildlife Research Center, Jamestown, ND. 17 pages.

In Illinois, area was not important in predictive occurrence and were present in areas < 10 ha. Minnesota territories average 0.2 ha, Illinois territories were 3.4 ha.

Herkert, J. R., D. E. Kroodsma, and J. P. Gibbs. 2001. Sedge Wren (Cistothorus platensis). In The Birds of North America, No. 582 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Territory boundaries are fluid throughout nesting season, and males may shift activity and defend new areas as season progresses. Territory size for 12 males in Minnesota averaged 1,780 m2 (range 1,274-3,559) (0.178 ha).

Migratory stopover habitats closely resemble preferred breeding habitats, but also occasionally found in other habitats including mesic grasslands; salt marshes; and alfalfa, clover, and rye fields

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Semipalmated Sandpiper

Calidris pusilla

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6703	Nonbreeding	Non-breeding Sighting	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. For many species that value habitat patches in the Landscape Project maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. Areas delineated as polygons and those delineated as points both received a 100 m buffer to account for the dynamic changes that occur to mudflats and beaches.

Literature:

N/A

N/A

Last researched by: Pitts

Date researched: 3/4/2024

Aves

Sharp-shinned Hawk
Accipiter striatus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5602	Breeding	Nest	800 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5607	Breeding	Breeding Sighting	800 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5609	Nonbreeding	Non-breeding Sighting	800 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

There are few studies available (summarized in Birds of North America). Two studies tracked four individuals, resulting in home ranges of 90-140 ha for females and 120-270 ha for males. Those areas convert to radii ranging 0.28-0.44 km (females) and 0.38-0.85 km (males). Another study tracked a pair in Utah that ranged in an area with a 0.80 km radius.

Wintering sharp-shinneds had slightly larger ranges in a NC study. Three tracked males had a mean range of 2.5 km2 (mean of 250 ha, radius=0.79 km), while three tracked females had a mean range of 2.8 km2 (mean of 280 ha, radius=0.88 km).

Literature:

Bildstein, K. L., and K. Meyer. 2000. Sharp-shinned Hawk (Accipiter striatus). In The Birds of North America, No. 482 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

N/A

Last researched by: Clark

Date researched: 2/1/2007

Aves

Short-eared Owl
Asio flammeus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4964	Breeding	Nest	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4966	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4968	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. For many species that value habitat patches in the Landscape Project maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In these cases, a default occurrence area (71.25 meter radius) is applied to take into account location uncertainty. These occurrence areas are used to value patches of habitat.

Literature:

N/A

N/A

Last researched by: Clark

Date researched: 2/1/2007

Aves

Snowy Egret
Egretta thula

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5610	Breeding	Nesting Colony	71.25 Meter Buffer	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes
5611	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5612	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
5613	Breeding	Roosting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5614	Breeding	Foraging	9.8 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5615	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Nesting area is defined by the area the birds actually use, as these birds do not defend a territory except immediately around their individual nests. The boundaries of the colony are defined as much by social attraction phenomenon and by habitat suitability. Consequently there is now immediately apparent justification for buffering the mapped extent of a nesting area. Where the mapped extent of a colony was available it was used. Where the mapped extent was not available the default seconds precision circle was used around the recorded nesting location point.

ENSP reviewed the literature regarding commuting distance for colonial nesting long-legged wading birds which fairly consistently indicates that the importance of suitable foraging habitat decreases with the distance from the nesting area (e.g. Dowd and Flake 1985, Custer et al. 2004, Kelly et al 1993, Thompson 1978). This is not surprising considering the energy demands of long commutes and the fact that, all other things being equal, if suitable foraging habitat is randomly distributed within the possible foraging range, simple geometry would argue that availability would increase with the square of the distance from the colony. Consequently, a particular type of wetland or riparian habitat is more critical if it is located close to a nesting area than a similar area located near the edge of the energetically feasible foraging range from the colony. It would therefore be unjustifiable to use the maximum foraging distance figures to define all potential foraging habitat as critical foraging habitat for a particular nesting colony. Conversely, using an average foraging

distance figure may under-include suitable habitat by omitting some foraging areas that are important because they provide particularly rich and easily exploited feeding habitat. Further, research (Custer et al. 2004) indicates that longer commuting distances are more frequent during high-demand and demographically critical nestling rearing period. Where the literature on commuting distance includes several studies, there can be wide variability in the mean commuting distances between different studies. When such was the case, we either averaged the reported mean commuting distances or used the information from the study with a large sample size or from an area most ecologically similar to New Jersey. We then doubled this figure.

Research in North Carolina found that 84% of breeding long-legged waterbirds flew to foraging areas, which is why habitat outside the vicinity of the colony must be valued as crucial to the success of the colony (Custer and Osborn 1978). A study in Florida at Lake Okeechobee found snowy egrets flew an average of 2.8 km from colonies to foraging areas and the maximum flight recorded was 5 kilometers (Smith 1995). Another study in Florida, in Everglades National Park, found that over the course of 2 field seasons, snowy egrets flew an average of 13km, with a maximum recorded distance of 31.5 km (Strong 1997). NatureServe recommends a minimum inferred extent of 3 km and justifies it by noting a low mean foraging range size for this group (NatureServe 2006). We apply a 15.8 km radius around a colony to protect foraging areas.

({13km +2.8 km}/2 = 7.9km *2 = 15.8km)

Literature:

Custer, C.M., S.A. Suarez, D.A. Olsen. 2004. Feeding habitat characteristics of the Great Blue Heron and Great Egret nesting along the Upper Mississippi River, 1995-1998. Waterbirds 27(4): 454-68.

The majority of the herons in this study fed <5 km from the nesting site, and avoided areas > 10 km away. They flew farther to sites during the brood-rearing period than during incubation. Only 10% of the feeding flights ended at a location where another heron was present, indicating that they prefer to feed alone.

Custer, T., R. Osborn. 1978. Feeding habitat use by colonially-breeding herons, egrets, and ibises in North Carolina. Auk 95: 733-743.

In North Carolina, 84% of breeding individuals flew to tidal foraging habitat. They generally prefer brackish/marine habitats with relatively shallow water.

Dowd and Flake. 1985. Foraging habits and movements of nesting Great Blue Heron in prairie river ecosystem, South Dakota. Journal of Field ornithology 56: 377-387.

A study in South Dakota found that the average distance that great blues flew from their colony to a foraging site was 3.1 km, and the maximum observed distance was 24.4 km. Eighty-five percent of the herons in the study fed within 4 km of the colony.

Kelly J. P., H. M. Pratt, P. L. Greene. 1993. The distribution, reproductive success, and habitat characteristics of heron and egret breeding colonies in the San Francisco Bay area. Colonial Waterbirds. 16: 18-27.

> 95% of great blue herons and >90% great egrets fed within 20 km of their colony.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 4, 2007).

The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 3 km. For

the breeding season, this figure is based on a low mean foraging range size for this group.

Smith, J. P. 1995. Foraging flights and habitat use of nesting wading birds (Ciconiiformes) at Lake Okeechobee, Florida. Colonial Waterbirds 18 (2): 139-158.

Snowy egrets at Lake Okeechobee, FL flew an average of 2.8 km from colonies to foraging areas in vicinity of Lake Okeechobee, FL. The maximum flight recorded was 5 kilometers. High water increased foraging flight distances for individuals.

Strong, A.M. 1997. Hydrological constraints of the Tricolored Heron and Snowy Egret resource use. Condor 99(4): 894-905.

A study in Everglades National Park, FL found that 95% of all the foraging locations (for both species) were located within 22 km of a nesting colony (mean flight distance + 2 SD). In 1987, mean distance flown to foraging location was 12.9 km + 4.8 km (n=68) and in 1988 it was 13.1 km + 6.3 km (n=156). The maximum distance traveled by a Snowy egret was 31.5 km.

Thompson. 1978. Feeding areas of Great Blue Herons and Great Egrets nesting in the floodplain of the upper Mississippi River. Proc. Colonial Waterbird Group. 2: 202-13.

In central Minnesota the average distance that the herons flew from the colony to a foraging area was 6.5 km, and the maximum observed was 20.4 km. Fifty-three percent of the herons in the study fed within 4 km of the colony.

Last researched by: Davis

Date researched: 1/1/2007

Aves

Tricolored Heron
Egretta tricolor

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5627	Breeding	Nesting Colony	90 meter radii around colony	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes
5628	Breeding	Foraging	9.0 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5629	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5630	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5631	Breeding	Roosting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
5632	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No

Justification:

Nesting area is defined by the area the birds actually use, as these birds do not defend a territory except immediately around their individual nests. The boundaries of the colony are defined as much by social attraction phenomenon and by habitat suitability. Consequently there is now immediately apparent justification for buffering the mapped extent of a nesting area. Where the mapped extent of a colony was available it was used. Where the mapped extent was not available the default seconds precision circle was used around the recorded nesting location point.

ENSP reviewed the literature regarding commuting distance for colonial nesting long-legged wading birds which fairly consistently indicates that the importance of suitable foraging habitat decreases with the distance from the nesting area (e.g. Dowd and Flake 1985, Custer et al. 2004, Kelly et al 1993, Thompson 1978). This is not surprising considering the energy demands of long commutes and the fact that, all other things being equal, if suitable foraging habitat is randomly distributed within the possible foraging range, simple geometry would argue that availability would increase with the square of the distance from the colony. Consequently, a particular type of wetland or riparian habitat is more critical if it is located close to a nesting area than a similar area located near the edge of the energetically feasible foraging range from the colony. It would therefore be unjustifiable to use the maximum foraging distance figures to define all potential foraging habitat as critical foraging habitat for a particular nesting colony. Conversely, using an average foraging

distance figure may under-include suitable habitat by omitting some foraging areas that are important because they provide particularly rich and easily exploited feeding habitat. Further, research (Custer et al. 2004) indicates that longer commuting distances are more frequent during high-demand and demographically critical nestling rearing period. Where the literature on commuting distance includes several studies, there can be wide variability in the mean commuting distances between different studies. When such was the case, we either averaged the reported mean commuting distances or used the information from the study with a large sample size or from an area most ecologically similar to New Jersey. We then doubled this figure.

Research in North Carolina found that 84% of breeding long-legged waterbirds flew to foraging areas, which is why habitat outside the vicinity of the colony must be valued as crucial to the success of the colony (Custer and Osborn 1978). In the Florida Everglades tricolored herons traveled an average of 5.6 km to forage, with a maximum reported distance of 25km (Bancroft, et al 1988). A different study in the Everglades found that over the course of three years tricolored herons traveled an average distance of 8.9 km, with a yearly average ranging from 5.4 km to 12.8 km. The range was hypothesized to be a result of varying water level fluctuations. The maximum distance traveled in this study was 27 km and 95% of the birds traveled within 22 km of their colony (Strong 1997). NatureServe recommends a minimum inferred extent of 3 km and justifies it by noting a low mean foraging range size for this group (NatureServe 2006). We apply a 14.5 km radius around a colony to protect foraging areas.

Literature:

Bancroft, G.T., S. D. Jewell, A. M. Strong. 1988. Foraging habitat of Egretta herons relative to stage in the nest cycle and water conditions. Third Annual Report. South Florida Water Management District, West Palm Beach, FL.

In the Florida Everglades foraging habitat was constrained to a mean foraging radius of 5.6 km ± 6.0 km SD (n=265). The maximum foraging commute recorded was 25 km.

Custer, C.M., S.A. Suarez, D.A. Olsen. 2004. Feeding habitat characteristics of the Great Blue Heron and Great Egret nesting along the Upper Mississippi River, 1995-1998. Waterbirds 27(4): 454-68.

The majority of the herons in this study fed <5 km from the nesting site, and avoided areas > 10 km away. They flew farther to sites during the brood-rearing period than during incubation. Only 10% of the feeding flights ended at a location where another heron was present, indicating that they prefer to feed alone.

Dowd and Flake. 1985. Foraging habits and movements of nesting Great Blue Heron in prairie river ecosystem, South Dakota. Journal of Field ornithology 56: 377-87.

A study in South Dakota found that the average distance that great blues flew from their colony to a foraging site was 3.1 km, and the maximum observed distance was 24.4 km. Eighty-five percent of the herons in the study fed within 4 km of the colony.

Kelly J. P., H. M. Pratt, P. L. Greene. 1993. The distribution, reproductive success, and habitat characteristics of heron and egret breeding colonies in the San Francisco Bay area. Colonial Waterbirds. 16: 18-27.

> 95% of great blue herons and >90% great egrets fed within 20 km of their colony.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life [web application]. Version 6.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: June 4, 2007).

The breeding inferred minimum extent of habitat use (when actual extent is unknown) is 3 km. For the breeding season, this figure is based on a low mean foraging range size for this group.

Strong, A.M. 1997. Hydrological constraints of the Tricolored Heron and Snowy Egret resource use. The Condor 99(4): 894-905.

A study in Everglades National Park, FL found that 95% of all the foraging locations (for both species) were located within 22 km of a nesting colony (mean flight distance + 2 SD). In 1987, mean distance flown to foraging location was 12.8km + 5.8 km (n=39), in 1988 it was 8.6 km + 4.3 km (n=91) and in 1989 it was 5.4 km + 3.9 km (n=135). The fluctuation in distance traveled may be due to the way yearly fluctuations in water level influence availability of foraging habitat. The maximum distance traveled by a tricolored heron was 27 km.

Thompson. 1978. Feeding areas of Great Blue Herons and Great Egrets nesting in the floodplain of the upper Mississippi River. Proc. Colonial Waterbird Group. 2: 202-213.

In central Minnesota the average distance that the herons flew from the colony to a foraging area was 6.5 km, and the maximum observed was 20.4 km. Fifty-three percent of the herons in the study fed within 4 km of the colony.

Last researched by: Davis

Date researched: 1/1/2007

Aves

Upland Sandpiper
Bartramia longicauda

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4948	Breeding	Breeding Sighting	1 km Buffer, min. patch 25 ha	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4949	Breeding	Breeding Sighting-Confirmed	1 km Buffer, min. patch 25 ha	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4950	Nonbreeding	Non-breeding Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Upland sandpipers are area-sensitive grassland birds and sensitive to habitat fragmentation. 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 and Bowen 2001). This species requires large areas of a mosaic of grassland and open habitats for breeding and rearing young. Minimum patch sizes varied greatly from 26 to 50 ha (Mitchell et al. 2000, Vickery et al. 1994). The minimum patch size of 26 ha reported was located closest to New Jersey than others reported. The breeding occurrence area chosen was based on the female territory size of 85.6 ha and increased because females will travel an average 869 m (and up to 3,275 m) from the nest as well as to incorporate post-fledging habitat (Houston and Bowen 2001). However, due to the area sensitivity of the species, only patches 25 ha and greater should be valued for breeding individuals of this species.

Little is known about the stopover habitat use of migratory upland sandpipers. Therefore, the migrant occurrence area was chosen based upon evidence that upland sandpipers travel a far distance to forage (Houston and Bowen 2001)

Literature:

Dechant, J. A., M. F. Dinkins, D. H. Johnson, L. D. Igl, C. M. Goldade, B. D. Parkin, and B. R. Euliss. 1999 (revised 2002). Effects of management practice on grassland birds: Upland Sandpiper. Northern Prairie Wildlife Research Center, Jamestown, ND. 34 pages.

In Wisconsin territory size was 8 - 12 ha. Illinois had minimum area requirements of 30 ha, southwest Missouri 75 ha, Nebraska had 50% incidence at 50 - 61 ha, and Maine had 50% incidence at 200 ha (see Vickery et al. below).

Houston, C. S. and D. E. Bowen, Jr. 2001. Upland Sandpiper (Bartramia longicauda). In The Birds of North America, No. 580 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Nests in loose colonies with little or no evidence of territoriality. Nesting territories were usually grouped. Courtship flight displays 200 - 400 m in diameter. North Dakota had an annual nesting density of 9.8 – 21.8 nests per 100 ha with a mean of 12.4 nests per 100 ha (1 nest per 8 ha).

Minnesota had fledglings move 300 m and 500 m from the nest. Illinois also had recent fledglings fly 170 - 410 m from the nest. Migratory stopover habitat in Texas includes plowed fields, rarely bottomlands. Females have large home ranges (85.6 ha) and can move and average 869 m from the nest. Males have smaller home ranges (8.5 ha).
Stopped at dry salt-hay marshes in New Jersey in summer and autumn, and in harvested corn (Zea mays) and agave (Agave sp.) fields and flooded acacia (Acacia sp.) and sorghum (Sorghum vulgar) near Guadalajara, Mexico (O. Reyna pers. comm.). Along Manu River in sw. Peru, from 21 Aug through 5 Nov, used beach habitats overgrown with Tessaria and weeds.

Mitchell, L. R., C. R. Smith and R. A. Malecki, R. A. 2000. Ecology of grassland breeding birds in the northeastern US - a literature review with recommendations for management. USGS, BRD, NY Cooperative Fish and Wildlife Research Unit, DNR, Cornell University, Ithaca, NY 14853-3011. September 2000.

A study in the northeastern United States showed minimum habitat requirement to be at least 100 ha but found 50% incidence at 30 - 40 ha. Two other studies in New York show minimum habitat requirements to be 26 ha and 46 ha. In St Lawrence River, habitat size ranged from 160 - 496 ha with a mean of 375 ha. In the Midwest, 50% incidence was found between 30 and 100 ha.

Vickery, P. D., M. L. Hunter, Jr. and S. M. Melvin. 1994. Effects of habitat area on the distribution of grassland birds in Maine. Conservation Biology 8(4): 1087-1097.

In Maine: Upland sandpipers have the greatest area requirements of all 10 species in study. They were rare on sites less than 50 ha and increased steadily with area. Reached 50% incidence at 200 ha. Territories are > 8 ha.

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Veery
Catharus fuscescens

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5634	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5637	Breeding	Breeding Sighting-Confirmed	85 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5638	Breeding	Breeding Sighting	85 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The breeding occurrence area was chosen based upon the upper limit of the mean territory size mentioned below (Bevier et al.), which came to 2.21 ha. The nonbreeding population is listed as stable in NJ, so the default occurrence area was chosen and will not be included in the Landscape Project.

Literature:

Bevier, L., A. F. Poole, and W. Moskoff. (2004). Veery (Catharus fuscescens). The Birds of North America Online. (A. Poole, Ed.) Ithaca: Cornell Laboratory of Ornithology; Retrieved from The Birds of North American Online database: http://bna.birds.cornell.edu/BNA/account/Veery/.

Prefers disturbed forest, probably because of denser understory not found in undisturbed forests. In northern hardwood forests, Veery bred in 77% of disturbed and successional habitats available but in only 18% of mature undisturbed habitats available. In mature woodlands, moisture regime is chief factor in habitat selection, more than twice as important as herb cover. Shrub cover is chief vegetative consideration in habitat selection - probably because shrubs provide safe nest sites.

In Middle Atlantic states requires forests of 20 ha for 50% probability of occurrence. In Illinois, of 22 forest patches in which known to breed, only 2 smaller than 100 ha.; average forest size of breeding area 309 ha. In red maple swamps of s. Rhode Island, while occurring in swamps as small as 1 ha, regional forest abundance may be more critical determinant of presence and abundance than swamp size.

Territories range from 0.10 ha to a few hectares. In Ontario (n = 61), average size of territory 0.25 ha; in s. Quebec (sugar maple/hemlock stand), 0.5 ha (A. Cyr unpubl.). In Hudson Valley, occasionally build nests within 15-20 m of each other within large, overlapping territories.

Rosenberg, K., R. Hames, R. Rohrbaugh, S. Barker Swarthout, J. Lowe, and A. Dhondt. 2003. A land manager's guide to improving habitat for forest thrushes. The Cornell Lab of Ornithology.

Veeries are area sensitive and intolerant of forest fragmentation even though they use disturbed habitats. Habitat with highest suitability consists of wet areas in 400 ha deciduous or mixed forests with 70% canopy closure. They also use coniferous and hemlock forests. The amount of area needed is related to the amount of fragmentation in the area. They can tolerate smaller fragments of 1 - 8 ha.

Last researched by: Petzinger

Date researched: 9/30/2008

Aves

Vesper Sparrow
Pooecetes gramineus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4852	Breeding	Breeding Sighting-Confirmed	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4853	Nonbreeding	Non-breeding Sighting	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4854	Breeding	Breeding Sighting	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Vesper breeding territories range from 0.29 - 8.19 ha in patches 5+ ha in size (Dechant et al. 2000, Jones and Cornerly 2002). The breeding occurrence area was selected based upon the Michigan upper limit territory size. The non-breeding occurrence area was chosen based upon the average winter home range size (Jones and Cornely 2002).

Literature:

Dechant, J. A., M. F. Dinkins, D. H. Johnson, L. D. Igl, C. M. Goldade, B. D. Parkin, and B. R. Euliss. 2000 (revised 2002). Effects of management practice on grassland birds: Vesper Sparrow. Northern Prairie Wildlife Research Center, Jamestown, ND. 41 pages.

Montana territories ranged from 0.29 - 3 ha and an average of 1.65 ha. Corn and soybean fields in Iowa had territories ranging from 1.6 - 8 ha and an average of 3 ha. Another Iowa study had territories ranging from 1.8 - 3.2 ha and averaging 2.3 ha. Michigan territories in a 5.6-ha field averaged 0.48 - 0.72 ha. Illinois tallgrass prairies contained vespers in small sites < 10 ha but not large sites (650 ha). Maine found vesper abundance to be positively correlated with area and 50% incidence at 20 ha.

Jones, S. L. and J. E. Cornely. 2002. Vesper Sparrow (Pooecetes gramineus). In The Birds of North America, No. 624 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

In Ohio, used open areas from 5 – 15 ha. Breeding territory size ranges from 0.29 – 8.19 ha. In Michigan, territories averaged 2.59 ha, but open field territories averaged 1.53 ha ± 0.33 SD and 1.03 ha ± 0.77 SD in fields with standing dead trees.

Stopover habitat consists of pastures and weeds bordering cultivated fields and roadsides, hedgerows, and barren to overgrown fields. Throughout much of range, commonly found near grassy or weedy ditches and fencerows, since fields are still barren upon arrival in early spring.

Wintering habitat in e. U.S. consists of patches of cleared and natural openings in forest land. On wintering range, home range of 142 m (n = 37) average for 3 yr; annual variation in size positively correlated to previous summer’s rainfall (Gordon 2000).

Mitchell, L. R., C. R. Smith and R. A. Malecki, R. A. 2000. Ecology of grassland breeding birds in the northeastern US - a literature review with recommendations for management. USGS, BRD, NY Cooperative Fish and Wildlife Research Unit, DNR, Cornell University, Ithaca, NY 14853-3011. September 2000.

Maine had 38 pairs in a 210-ha patch and 50% incidence at 20 ha (see Vickery et al. 1994 below). Missouri had a range of patch size from 10 - 100 ha. Illinois had minimum patch size of 10 ha. No information on territory size was provided.

Vickery, P. D., M. L. Hunter, Jr. and S. M. Melvin. 1994. Effects of habitat area on the distribution of grassland birds in Maine. Conservation Biology 8(4): 1087-1097.

In Maine, 50% incidence for vespers were reached at 20 ha.

Last researched by: Petzinger

Date researched: 2/1/2007

Aves

Winter Wren
Troglodytes hiemalis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5669	Breeding	Breeding Sighting	110 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5671	Breeding	Breeding Sighting-Confirmed	110 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5673	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

The breeding buffer was chosen based on the upper confidence limit of the mean habitat size for second nesting attempts (3.3 ha ± 1.2 SD, n = 22) (Hejl et al. 2002), which calculates to 3.8 ha. Non-breeding wrens are listed as stable in New Jersey, so the default buffer was chosen and will not be used in the Landscape Project..

Literature:

Hejl, S. J., J. A. Holmes, and D. E. Kroodsma. 2002. Winter Wren (Troglodytes troglodytes). In The Birds of North America, No. 632 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

Winter Wrens use all types of forest near water, especially old-growth structures (snags, downed logs, and large trees) for nesting, foraging, and roosting. Clearcutting and some types of partial logging reduce habitat suitability for the Winter Wren

Shape, size, density, and distribution of territories is influenced by habitat and topography. Territories appear to be preferentially established along streams or other water sources, especially in drier habitats, resulting in patchy distribution

Territory size varies both within and between habitats. In n. Idaho, breeding-territory size overall ranged from 0.8 to 6 ha; 0.8-4.0 ha (mean 1.9 ha ± 0.9 SD; n = 17) within old-growth cedar-hemlock forests and 1.0 to 3.3 in fragmented old growth (mean 2.1 ha ± 0.8 SD; n = 11) interspersed with 4- to 11-yr-old clearcuts. Averaged 2.0 ha ± 0.9 SD (n = 28) for first nesting attempts and 3.3 ha ± 1.2 SD (n = 22) for second attempts. Family groups used these areas after nesting. In se. Alaska, territory size ranged from 0.7 to 4.8 ha, averaged 2.2 ha ± 0.3 SD, and differed significantly among 3 sites (n = 15). In coastal western hemlock in British Columbia, breeding-territory sizes ranged from 0.48 to 2.21 ha and averaged 1.38 ha ± 0.51 SD (n = 14) in 1979 and 1.23 ha ± 0.50 SD (n = 12) in 1980. In a separate study in similar habitat of British Columbia, average size of territories over 3 yr ranged from 0.68 to 1.46 ha.

Conservative estimates of fall-territory size ranged from 0.42 to 1.31 ha and winter territory size ranged from 0.14 to 1.45 ha. In Idaho, territories shifted between broods (SJH and JAH). In British Columbia, territory shifts occurred at beginning of winter, at junction with breeding season, and breeding/fall juncture.

Last researched by: Petzinger

Date researched: 9/30/2008

Aves

Wood Thrush
Hylocichla mustelina

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5675	Breeding	Breeding Sighting-Confirmed	800 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5677	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5679	Breeding	Breeding Sighting	800 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Territories and home ranges of breeding Wood Thrush vary, and breeding adults will travel 550m from the territory. Breeding pairs have also traveled long distances to re-nest after initial nest failure, and fledglings can disperse 1-2 km from natal territories (Evans et al. 2020). The breeding occurrence area was chosen based upon the distance traveled outside of the upper limit territory size by breeding adults.

The non-breeding population is listed as stable in New Jersey, so the default buffer was chosen and will not be used in the Landscape Project.

Literature:

Evans, M., E. Gow, R. R. Roth, M. S. Johnson, and T. J. Underwood (2020). Wood Thrush (Hylocichla mustelina), 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.woothr.0

Reported territory sizes range between 0.08-4.0 ha (Twomey 1945, Weaver 1949, Evans et al. 2008). Males establish and defend the territories (see Sounds). Defended territories vary spatially and temporally during the breeding season; social pairs have been observed dispersing large distances (up to 17 km away) between nesting attempts, though most renesting attempts occur within 250 m of the previous nest site (Lang et al. 2002). Moreover, previous studies have observed banded individuals of both sexes well away from their nest and in other active, presumed territories (Brackbill 1943, Holmes and Robinson 1988, RRR). Females nest within territory. However, the extent to which owners use off-territory forays to gather nest materials outside of their territories is currently unknown.

Natal home range 2.6-24.8 ha (Anders et al. 1998). Individuals have been observed foraying up to 550 m off-territory within a nesting cycle (Evans et al. 2008).

A radiotracking study conducted on a population in Georgia showed that fledglings remain on their natal home range for 24 d, on average (Lang et al. 2002). Similarly, in Missouri, juveniles dispersed from natal sites 33 days post-hatching (Vega Rivera et al. 1998a). In Missouri, Georgia, and Virginia populations, most juveniles disperse 1.5-2 km away from their natal home range (Anders et al. 1998, Vega Rivera et al. 1998a, Lang et al. 2002), although rarely juveniles may remain on their natal territory (Lang et al. 2002). Some individuals may continue to disperse 5-6 km away from their first dispersal site prior to beginning migration (Vega Rivera et al. 1998a, Lang et al. 2002). Most individuals disperse as part of juvenile flocks (Vega Rivera et al. 1998a). The habitat typically used by juveniles during dispersal is characterized by dense understory and thick groundcover (Anders et al. 1998, Vega Rivera et al. 1998a, Lang et al. 2002; also see Breeding).

Telemetry shows young, with parent, 200-400 m from nest for 2-3 wk after fledging in Georgia and Smoky Mtns. (Powell et al. 1995, Simons and Farnsworth 1996); Virginia, between broods family group remained within 62m of nest site (Vega Rivera et al. 2000). Leave natal site ~32.5 days after hatching (Vega Rivera et al.1998a) and reach independence 28-36 days post-hatching (Vega Rivera 2000), juvenile then join flocks; movement patterns are related to food resources and presence of conspecifics (Vega Rivera et al. 1998a; see also BEHAVIOR).

Rosenberg, K., R. Hames, R. Rohrbaugh, S. Barker Swarthout, J. Lowe, and A. Dhondt. 2003. A land manager's guide to improving habitat for forest thrushes. The Cornell Lab of Ornithology.

Breeds in interior and edges of deciduous and mixed forests in cool, moist sites near water. Requires moderate to dense understory with a lot of shade, moist soil, and decaying leaf litter. High suitability is in forest patches at least 81 ha (200 acres) with suitability declining in patches less than 40.5 ha (100 acres). Can breed in smaller patches but have lower reproductive success. Must factor in forest size, amount of core area, amount of edge, and vegetation structure.

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Yellow-breasted Chat
Icteria virens

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5694	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
5695	Breeding	Breeding Sighting-Confirmed	425 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5697	Breeding	Breeding Sighting	425 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Breeding territories range from 0.4 - 2.4 ha and average home range size can be up to 5.2 ha (Thompson and Eckerle 2022), and both males and females will travel outside the breeding territory while nesting, sometimes up to 1.5 km (Thompson and Eckerle 2022, Lehnen and Rodewald 2013). Therefore, the breeding occurrence area was based on the upper home range size of 5 ha plus 300 m to account for breeding adults traveling outside the breeding territory.

The nonbreeding population is listed as stable in NJ, so the default buffer was chosen and will not be used in the Landscape Project.

Literature:

Lehnen, S. E. and A. D. Rodewald. 2013. Dail and seasonal movements of a shrubland-obligate breeder in relation to mature forest edge habitat. Forest Ecology and Management 305:112-119.

One Yellow-breasted Chat on foray was located in a shrubland patch 1.5 km east from its capture patch the day after marking; the following day it was not located in any patch within 3 km of the original site.

Thompson, C. F. and K. P. Eckerle (2022). Yellow-breasted Chat (Icteria virens), version 2.0. In Birds of the World (P. G. Rodewald and B. K. Keeney, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.yebcha.02

During the breeding period, the male maintains and defends a territory (3, 5), although considerable overlap in home ranges/territories has been reported in movement studies that used radio-telemetry (202, 15). Early reports suggested that pairs tend to congregate, suggesting a degree of loose coloniality that may be independent of differences in availability of suitable habitat (407, 3); however, subsequent studies have not mentioned this. During the course of settlement on a breeding area, territory or home-range size decreased as more males arrived (5). Effectiveness of territorial defense appears to decline with increasing population densities. In a low-density population in southern Indiana (yearly mean territory size ranged 1.1-1.6 ha, n = 4 yr; grand mean 1.2 ha ± 0.51 SD, range 0.4-2.4, n = 28), and fights between neighboring males were rare (5). In a high-density population (territory size ranged from 0.5 to 1.0 ha) in Virginia, territorial intrusions and male-male interactions were the rule, as intruders were frequently captured in mist-nets well within boundaries of neighboring territories (3). In southern Illinois, 4 territories were 0.35-1.75 ha (mean 0.82; 408). In southeastern Ohio, 39 radio-tracked males had a mean 95% kernel home range of 3.3 ha ± 3.6 SD, high rates of extra-territory movements, and did not appear to avoid edge habitat (202). For 7 radio-tracked adults in northeastern Alabama, home ranges (95% contour) varied from 0.46-5.14 ha (409). In south-central Indiana, natal home ranges (i.e., the area occupied between nest-leaving and dispersal) of 6 radio-tracked fledglings was mean 0.453 ha ± 0.247 SE, range 0.068-0.283, and post-dispersal home ranges (i.e., an area occupied for at least 5 consecutive days that did not overlap with the natal home range) by 5 fledglings was mean 0.892 ha ± 0.227 SE. Some fledglings conducted "exploratory" moves from their post-dispersal home range (290).

In southern British Columbia, mean territory size in riparian habitat was 0.25 ha ± 0.24 SD, n = 20 (236) and 0.37 ha ± 0.27 SD, n = 66 (16). In a later study in the same area, also based on observations of singing and perching locations, mean territory size was 0.55 ha ± 0.17 SD, range 0.29-0.95, although use of radio-telemetry on a small sample of males indicated a larger "home-range" size (18). In northern California, 3-10-yr-old post-restoration riparian sites on the Trinity River had a mean territory size of 0.57 ha ± 0.18 SD, n = 105, compared with 0.50 ha ± 0.17 SD, n = 206, on reference sites (410).

Visits to territories of conspecifics (extraterritorial forays) by both males and females are common and likely explain why mist-nets caught many more chats on a small area than were detected by transect sampling or spot-mapping (411).

Last researched by: Petzinger

Date researched: 8/24/2023

Aves

Yellow-crowned Night-heron
Nyctanassa violacea

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4990	Nonbreeding	Non-breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4991	Breeding	Roosting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4992	Breeding	Foraging	1.7 mile radii of open water/emergent wetland	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4993	Nonbreeding	Non-breeding Concentration	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	No
4994	Breeding	Breeding Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
4995	Breeding	Nesting Colony	71.25 Meter Buffer	2 copies needed - both get rule #1, but different buffer sizes	Convert to a point and buffer	2 copies needed - one gets rule #3, the other #1	Yes

Justification:

Nesting area is defined by the area the birds actually use, as these birds do not defend a territory except immediately around their individual nests. The boundaries of the colony are defined as much by social attraction phenomenon and by habitat suitability. Consequently there is now immediately apparent justification for buffering the mapped extent of a nesting area. Where the mapped extent of a colony was available it was used. Where the mapped extent was not available the default seconds precision circle was used around the recorded nesting location point.

ENSP reviewed the literature regarding commuting distance for colonial nesting long-legged wading birds which fairly consistently indicates that the importance of suitable foraging habitat decreases with the distance from the nesting area (e.g. Dowd and Flake 1985, Custer et al. 2004, Kelly et al 1993, Thompson 1978). This is not surprising considering the energy demands of long commutes and the fact that, all other things being equal, if suitable foraging habitat is randomly distributed within the possible foraging range, simple geometry would argue that availability would increase with the square of the distance from the colony. Consequently, a particular type of wetland or riparian habitat is more critical if it is located close to a nesting area than a similar area located near the edge of the energetically feasible foraging range from the colony. It would therefore be unjustifiable to use the maximum foraging distance figures to define all potential foraging habitat as critical foraging habitat for a particular nesting colony. Conversely, using an average foraging

distance figure may under-include suitable habitat by omitting some foraging areas that are important because they provide particularly rich and easily exploited feeding habitat.

Further, research (Custer et al. 2004) indicates that longer commuting distances are more frequent during high-demand and demographically critical nestling rearing period. Where the literature on commuting distance includes several studies, there can be wide variability in the mean commuting distances between different studies. When such was the case, we either averaged the reported mean commuting distances or used the information from the study with a large sample size or from an area most ecologically similar to New Jersey. We then doubled this figure.

A study conducted in North Carolina determined that the average foraging commute was 1.4 km (Custer and Osborn 1978). Research from the Chesapeake Bay found a smaller average foraging commute at <0.5 km. NatureServe recommends a minimum inferred extent of 3 km and justifies it by noting a low mean foraging range size (NatureServe 2006). We apply a 2.7 km radius around a colony to protect foraging areas.

Literature:

Bentley. 1994. Use of a landscape-level approach to determine the habitat requirements of the yellow-crowned night-heron in the lower Chesapeake Bay. Masters Thesis, College of William and Mary, Williamsburg, Virginia.

Average distance between nest and foraging area was <0.5 km.

Custer and Osborn. 1978. Feeding habitat use by colonially breeding herons, egrets and ibises in North Carolina. Auk 95: 733-743.

Average distance between nests and foraging areas was 1.4 km.

Custer, C.M., S.A. Suarez, D.A. Olsen. 2004. Feeding habitat characteristics of the Great Blue Heron and Great Egret nesting along the Upper Mississippi River, 1995-1998. Waterbirds 27(4): 454-468.

The majority of the herons in this study fed <5 km from the nesting site, and avoided areas > 10 km away. They flew farther to sites during the brood-rearing period than during incubation. Only 10% of the feeding flights ended at a location where another heron was present, indicating that they prefer to feed alone.

Dowd and Flake. 1985. Foraging habits and movements of nesting Great Blue Heron in prairie river ecosystem, South Dakota. Journal of Field ornithology 56: 377-387.

A study in South Dakota found that the average distance that great blues flew from their colony to a foraging site was 3.1 km, and the maximum observed distance was 24.4 km. Eighty-five percent of the herons in the study fed within 4 km of the colony.

Kelly J. P., H. M. Pratt, P. L. Greene. 1993. The distribution, reproductive success, and habitat characteristics of heron and egret breeding colonies in the San Francisco Bay area. Colonial Waterbirds. 16: 18-27.

> 95% of great blue herons and >90% great egrets fed within 20 km of their colony.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

The inferred minimum extent habitat use (when actual extent is unknown) is 3 km. This is based on

a low mean foraging range size.

Thompson. 1978. Feeding areas of Great Blue Herons and Great Egrets nesting in the floodplain of the upper Mississippi River. Proc. Colonial Waterbird Group. 2: 202-213.

In central Minnesota the average distance that the herons flew from the colony to a foraging area was 6.5 km, and the maximum observed was 20.4 km. Fifty-three percent of the herons in the study fed within 4 km of the colony.

Last researched by: Davis

Date researched: 7/1/2006

Bivalvia

Brook Floater

Alasmidonta varicosa

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5008	Not applicable	Fresh Shell Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5009	Not applicable	Fresh Dead Individual	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5010	Not applicable	Glochidia Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5011	Not applicable	Live Individual Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5012	Not applicable	Relict Shell	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No

Justification:

Although adult freshwater mussels are mostly sedentary, their larvae (glochidia) with few exceptions are obligate parasites on specific fish hosts. Without the host fish, mussel species are unable to complete their reproductive cycle and therefore face extinction (Bogan 1993). Movement of host fishes bearing glochidia is by far the main mechanism of freshwater mussel dispersal (Watters 1992). Given the potential distance of transport by host fishes, D. Strayer (pers. comm.) as reported by Cordeiro, J. (2004) on the NatureServe web site, suggests a separation distance of at least 10 km when reporting freshwater mussel occurrences. Cordeiro (2004) recommends a separation distance in flowing water of 2 kilometers between sightings in unsuitable habitat and 10 km in suitable habitat. Populations/occurrences as defined by NatureServe are based on some evidence of historic or current presence, including live specimens or recently dead shells (including soft tissue still attached and/or nacre still glossy without signs of external weathering or staining) at any given location with potentially recurring existence. Given that separation distance based on potential host fish dispersal is somewhat arbitrary, the application of a 50 m radius buffer which is then buffered upstream and downstream by .75 m is conservative. Also, our recommendations do not take into account distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Bogan, A. 1993. Freshwater bivalve extinctions (Mollusca: Unionoida): a search for causes. Amer. Zool. 33:599-609.

N/A

Cordeiro, J. (2004). NatureServe Web Site. Population/occurrence delineation for freshwater mussels.

N/A

Watters, G.T. 1992. Unionids, fishes, and the species-area curve. Journal of Biogeography 19:481-490.

N/A

Last researched by: Bowers-Altman

Date researched: 1/1/2007

Bivalvia

Creeper
Strophitus undulatus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5169	Not applicable	Glochidia Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5170	Not applicable	Relict Shell	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5171	Not applicable	Live Individual Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5172	Not applicable	Fresh Shell Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5173	Not applicable	Fresh Dead Individual	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes

Justification:

Although adult freshwater mussels are mostly sedentary, their larvae (glochidia) with few exceptions are obligate parasites on specific fish hosts. Without the host fish, mussel species are unable to complete their reproductive cycle and therefore face extinction (Bogan 1993). Movement of host fishes bearing glochidia is by far the main mechanism of freshwater mussel dispersal (Watters 1992). Given the potential distance of transport by host fishes, D. Strayer (pers. comm.) as reported by Cordeiro, J. (2004) on the NatureServe web site, suggests a separation distance of at least 10 km when reporting freshwater mussel occurrences. Cordeiro (2004) recommends a separation distance in flowing water of 2 kilometers between sightings in unsuitable habitat and 10 km in suitable habitat. Populations/occurrences as defined by NatureServe are based on some evidence of historic or current presence, including live specimens or recently dead shells (including soft tissue still attached and/or nacre still glossy without signs of external weathering or staining) at any given location with potentially recurring existence. Given that separation distance based on potential host fish dispersal is somewhat arbitrary, the application of a 50 m radius buffer which is then buffered upstream and downstream by .75 m is conservative. Also, our recommendations do not take into account distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Bogan, A. 1993. Freshwater bivalve extinctions (Mollusca: Unionoida): a search for causes. Amer. Zool. 33:599-609.

N/A

Cordeiro, J. (2004). NatureServe Web Site. Population/occurrence delineation for freshwater mussels.

N/A

Watters, G.T. 1992. Unionids, fishes, and the species-area curve. Journal of Biogeography 19:481-490.

N/A

Last researched by: Bowers-Altman

Date researched: 1/1/2007

Bivalvia

Dwarf Wedgemussel
Alasmidonta heterodon

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5003	Not applicable	Fresh Shell Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5004	Not applicable	Fresh Dead Individual	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5005	Not applicable	Live Individual Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5006	Not applicable	Relict Shell	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5007	Not applicable	Glochidia Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No

Justification:

Although adult freshwater mussels are mostly sedentary, their larvae (glochidia) with few exceptions are obligate parasites on specific fish hosts. Without the host fish, mussel species are unable to complete their reproductive cycle and therefore face extinction (Bogan 1993). Movement of host fishes bearing glochidia is by far the main mechanism of freshwater mussel dispersal (Watters 1992). Given the potential distance of transport by host fishes, D. Strayer (pers. comm.) as reported by Cordeiro, J. (2004) on the NatureServe web site, suggests a separation distance of at least 10 km when reporting freshwater mussel occurrences. Cordeiro (2004) recommends a separation distance in flowing water of 2 kilometers between sightings in unsuitable habitat and 10 km in suitable habitat. Populations/occurrences as defined by NatureServe are based on some evidence of historic or current presence, including live specimens or recently dead shells (including soft tissue still attached and/or nacre still glossy without signs of external weathering or staining) at any given location with potentially recurring existence. Given that separation distance based on potential host fish dispersal is somewhat arbitrary, the application of a 50 m radius buffer which is then buffered upstream and downstream by .75 m is conservative. Also, our recommendations do not take into account distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Bogan, A. 1993. Freshwater bivalve extinctions (Mollusca: Unionoida): a search for causes. Amer. Zool. 33:599-609.

N/A

Cordeiro, J. (2004). NatureServe Web Site. Population/occurrence delineation for freshwater mussels.

N/A

Watters, G.T. 1992. Unionids, fishes, and the species-area curve. Journal of Biogeography 19:481-490.

N/A

Last researched by: Bowers-Altman

Date researched: 1/1/2007

Bivalvia

Eastern Lampmussel
Lampsilis radiata

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5018	Not applicable	Fresh Shell Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5019	Not applicable	Fresh Dead Individual	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5020	Not applicable	Glochidia Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5021	Not applicable	Relict Shell	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5022	Not applicable	Live Individual Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes

Justification:

Although adult freshwater mussels are mostly sedentary, their larvae (glochidia) with few exceptions are obligate parasites on specific fish hosts. Without the host fish, mussel species are unable to complete their reproductive cycle and therefore face extinction (Bogan 1993). Movement of host fishes bearing glochidia is by far the main mechanism of freshwater mussel dispersal (Watters 1992). Given the potential distance of transport by host fishes, D. Strayer (pers. comm.) as reported by Cordeiro, J. (2004) on the NatureServe web site, suggests a separation distance of at least 10 km when reporting freshwater mussel occurrences. Cordeiro (2004) recommends a separation distance in flowing water of 2 kilometers between sightings in unsuitable habitat and 10 km in suitable habitat. Populations/occurrences as defined by NatureServe are based on some evidence of historic or current presence, including live specimens or recently dead shells (including soft tissue still attached and/or nacre still glossy without signs of external weathering or staining) at any given location with potentially recurring existence. Given that separation distance based on potential host fish dispersal is somewhat arbitrary, the application of a 50 m radius buffer which is then buffered upstream and downstream by .75 m is conservative. Also, our recommendations do not take into account distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Bogan, A. 1993. Freshwater bivalve extinctions (Mollusca: Unionoida): a search for causes. Amer. Zool. 33:599-609.

N/A

Cordeiro, J. (2004). NatureServe Web Site. Population/occurrence delineation for freshwater mussels.

N/A

Watters, G.T. 1992. Unionids, fishes, and the species-area curve. Journal of Biogeography 19:481-490.

N/A

Last researched by: Bowers-Altman

Date researched: 1/1/2007

Bivalvia

Eastern Pondmussel

Ligumia nasuta

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5038	Not applicable	Relict Shell	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5039	Not applicable	Live Individual Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5040	Not applicable	Fresh Dead Individual	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5041	Not applicable	Glochidia Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5042	Not applicable	Fresh Shell Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes

Justification:

Although adult freshwater mussels are mostly sedentary, their larvae (glochidia) with few exceptions are obligate parasites on specific fish hosts. Without the host fish, mussel species are unable to complete their reproductive cycle and therefore face extinction (Bogan 1993). Movement of host fishes bearing glochidia is by far the main mechanism of freshwater mussel dispersal (Watters 1992). Given the potential distance of transport by host fishes, D. Strayer (pers. comm.) as reported by Cordeiro, J. (2004) on the NatureServe web site, suggests a separation distance of at least 10 km when reporting freshwater mussel occurrences. Cordeiro (2004) recommends a separation distance in flowing water of 2 kilometers between sightings in unsuitable habitat and 10 km in suitable habitat. Populations/occurrences as defined by NatureServe are based on some evidence of historic or current presence, including live specimens or recently dead shells (including soft tissue still attached and/or nacre still glossy without signs of external weathering or staining) at any given location with potentially recurring existence. Given that separation distance based on potential host fish dispersal is somewhat arbitrary, the application of a 50 m radius buffer which is then buffered upstream and downstream by .75 m is conservative. Also, our recommendations do not take into account distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Bogan, A. 1993. Freshwater bivalve extinctions (Mollusca: Unionoida): a search for causes. Amer. Zool. 33:599-609.

N/A

Cordeiro, J. (2004). NatureServe Web Site. Population/occurrence delineation for freshwater mussels.

N/A

Watters, G.T. 1992. Unionids, fishes, and the species-area curve. Journal of Biogeography 19:481-490.

N/A

Last researched by: Bowers-Altman

Date researched: 1/1/2007

Bivalvia

Green Floater
Lasmigona subviridis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5013	Not applicable	Glochidia Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5014	Not applicable	Relict Shell	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5015	Not applicable	Live Individual Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5016	Not applicable	Fresh Dead Individual	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5017	Not applicable	Fresh Shell Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes

Justification:

Although adult freshwater mussels are mostly sedentary, their larvae (glochidia) with few exceptions are obligate parasites on specific fish hosts. Without the host fish, mussel species are unable to complete their reproductive cycle and therefore face extinction (Bogan 1993). Movement of host fishes bearing glochidia is by far the main mechanism of freshwater mussel dispersal (Watters 1992). Given the potential distance of transport by host fishes, D. Strayer (pers. comm.) as reported by Cordeiro, J. (2004) on the NatureServe web site, suggests a separation distance of at least 10 km when reporting freshwater mussel occurrences. Cordeiro (2004) recommends a separation distance in flowing water of 2 kilometers between sightings in unsuitable habitat and 10 km in suitable habitat. Populations/occurrences as defined by NatureServe are based on some evidence of historic or current presence, including live specimens or recently dead shells (including soft tissue still attached and/or nacre still glossy without signs of external weathering or staining) at any given location with potentially recurring existence. Given that separation distance based on potential host fish dispersal is somewhat arbitrary, the application of a 50 m radius buffer which is then buffered upstream and downstream by .75 m is conservative. Also, our recommendations do not take into account distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Bogan, A. 1993. Freshwater bivalve extinctions (Mollusca: Unionoida): a search for causes. Amer. Zool. 33:599-609.

N/A

Cordeiro, J. (2004). NatureServe Web Site. Population/occurrence delineation for freshwater mussels.

N/A

Watters, G.T. 1992. Unionids, fishes, and the species-area curve. Journal of Biogeography 19:481-490.

N/A

Last researched by: Bowers-Altman

Date researched: 1/1/2007

Bivalvia

Tidewater Mucket
Leptodea ochracea

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5023	Not applicable	Relict Shell	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5024	Not applicable	Fresh Dead Individual	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5025	Not applicable	Glochidia Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5026	Not applicable	Live Individual Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5027	Not applicable	Fresh Shell Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes

Justification:

Although adult freshwater mussels are mostly sedentary, their larvae (glochidia) with few exceptions are obligate parasites on specific fish hosts. Without the host fish, mussel species are unable to complete their reproductive cycle and therefore face extinction (Bogan 1993). Movement of host fishes bearing glochidia is by far the main mechanism of freshwater mussel dispersal (Watters 1992). Given the potential distance of transport by host fishes, D. Strayer (pers. comm.) as reported by Cordeiro, J. (2004) on the NatureServe web site, suggests a separation distance of at least 10 km when reporting freshwater mussel occurrences. Cordeiro (2004) recommends a separation distance in flowing water of 2 kilometers between sightings in unsuitable habitat and 10 km in suitable habitat. Populations/occurrences as defined by NatureServe are based on some evidence of historic or current presence, including live specimens or recently dead shells (including soft tissue still attached and/or nacre still glossy without signs of external weathering or staining) at any given location with potentially recurring existence. Given that separation distance based on potential host fish dispersal is somewhat arbitrary, the application of a 50 m radius buffer which is then buffered upstream and downstream by .75 m is conservative. Also, our recommendations do not take into account distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Bogan, A. 1993. Freshwater bivalve extinctions (Mollusca: Unionoida): a search for causes. Amer. Zool. 33:599-609.

N/A

Cordeiro, J. (2004). NatureServe Web Site. Population/occurrence delineation for freshwater mussels.

N/A

Watters, G.T. 1992. Unionids, fishes, and the species-area curve. Journal of Biogeography 19:481-490.

N/A

Last researched by: Bowers-Altman

Date researched: 1/1/2007

Bivalvia

Triangle Floater
Alasmidonta undulata

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5033	Not applicable	Relict Shell	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5034	Not applicable	Fresh Shell Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5035	Not applicable	Glochidia Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5036	Not applicable	Live Individual Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5037	Not applicable	Fresh Dead Individual	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes

Justification:

Although adult freshwater mussels are mostly sedentary, their larvae (glochidia) with few exceptions are obligate parasites on specific fish hosts. Without the host fish, mussel species are unable to complete their reproductive cycle and therefore face extinction (Bogan 1993). Movement of host fishes bearing glochidia is by far the main mechanism of freshwater mussel dispersal (Watters 1992). Given the potential distance of transport by host fishes, D. Strayer (pers. comm.) as reported by Cordeiro, J. (2004) on the NatureServe web site, suggests a separation distance of at least 10 km when reporting freshwater mussel occurrences. Cordeiro (2004) recommends a separation distance in flowing water of 2 kilometers between sightings in unsuitable habitat and 10 km in suitable habitat. Populations/occurrences as defined by NatureServe are based on some evidence of historic or current presence, including live specimens or recently dead shells (including soft tissue still attached and/or nacre still glossy without signs of external weathering or staining) at any given location with potentially recurring existence. Given that separation distance based on potential host fish dispersal is somewhat arbitrary, the application of a 50 m radius buffer which is then buffered upstream and downstream by .75 m is conservative. Also, our recommendations do not take into account distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Bogan, A. 1993. Freshwater bivalve extinctions (Mollusca: Unionoida): a search for causes. Amer. Zool. 33:599-609.

N/A

Cordeiro, J. (2004). NatureServe Web Site. Population/occurrence delineation for freshwater mussels.

N/A

Watters, G.T. 1992. Unionids, fishes, and the species-area curve. Journal of Biogeography 19:481-490.

N/A

Last researched by: Bowers-Altman

Date researched: 1/1/2007

Bivalvia

Yellow Lampmussel
Lampsilis cariosa

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5028	Not applicable	Fresh Shell Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5029	Not applicable	Live Individual Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5030	Not applicable	Glochidia Sighting	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No
5031	Not applicable	Fresh Dead Individual	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5032	Not applicable	Relict Shell	50 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	No

Justification:

Although adult freshwater mussels are mostly sedentary, their larvae (glochidia) with few exceptions are obligate parasites on specific fish hosts. Without the host fish, mussel species are unable to complete their reproductive cycle and therefore face extinction (Bogan 1993). Movement of host fishes bearing glochidia is by far the main mechanism of freshwater mussel dispersal (Watters 1992). Given the potential distance of transport by host fishes, D. Strayer (pers. comm.) as reported by Cordeiro, J. (2004) on the NatureServe web site, suggests a separation distance of at least 10 km when reporting freshwater mussel occurrences. Cordeiro (2004) recommends a separation distance in flowing water of 2 kilometers between sightings in unsuitable habitat and 10 km in suitable habitat. Populations/occurrences as defined by NatureServe are based on some evidence of historic or current presence, including live specimens or recently dead shells (including soft tissue still attached and/or nacre still glossy without signs of external weathering or staining) at any given location with potentially recurring existence. Given that separation distance based on potential host fish dispersal is somewhat arbitrary, the application of a 50 m radius buffer which is then buffered upstream and downstream by .75 m is conservative. Also, our recommendations do not take into account distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Bogan, A. 1993. Freshwater bivalve extinctions (Mollusca: Unionoida): a search for causes. Amer. Zool. 33:599-609.

N/A

Cordeiro, J. (2004). NatureServe Web Site. Population/occurrence delineation for freshwater mussels.

N/A

Watters, G.T. 1992. Unionids, fishes, and the species-area curve. Journal of Biogeography 19:481-490.

N/A

Last researched by: Bowers-Altman

Date researched: 1/1/2007

Branchiopoda

Eastern Fairy Shrimp

Eubranchipus holmanii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8598	Not applicable	Occupied Habitat	100 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning the Eastern Fairy Shrimp's spatial requirements, a 100-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

ENSP Biologist Expert Opinion: R. Somes

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: November 19, 2018).

Last researched by: Somes

Date researched: 12/19/2018

Insecta

Acadian Hairstreak
Satyrium acadica

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8060	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8061	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8062	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8063	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8064	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Acadian Hairstreak's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, N

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application].

Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: November 19, 2018).

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, N

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Allegheny River Cruiser
Macromia alleghaniensis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5841	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5842	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5843	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5844	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5845	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5846	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

American Burying Beetle
Nicrophorus americanus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7846	Not applicable	Breeding/Courtship	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
7847	Not applicable	Larvae Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
7848	Not applicable	Occupied Habitat	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. For many species that value habitat patches in the Landscape Project maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In these cases, a default occurrence area (71.25 meter radius) is applied to take into account location uncertainty. These occurrence areas are used to value patches of habitat.

Literature:

N/A

N/A

Last researched by: Somes

Date researched: 1/1/2006

Insecta

Appalachian Grizzled Skipper
Pyrgus centaureae wyandot

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5048	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5049	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5050	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5051	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5052	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Appalachian Grizzled Skipper ‘s spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, BE and L Niles. 2003. Endangered and Threatened Wildlife of New Jersey. New Brunswick, NJ: Rutger’s University Press.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M and J Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutger's University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Appalachian Grizzled Skipper. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, PA and V Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin. New York, NY.

N/A

Scott, J. 1986. The butterflies of North America: a natural history and field guide. Stanford University Press. Stanford, CA.

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Arrowhead Spiketail
Cordulegaster obliqua

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5871	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5872	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5873	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5874	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5875	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5876	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Baltimore Checkerspot
Euphydryas phaeton

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8537	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8538	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8539	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8540	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8541	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning the Baltimore Checkerspot's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

NatureServe. 2009. Acadian Hairstreak. In: NatureServe Explorer: An online encyclopedia

of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Banner Clubtail
Hylogomphus apomyius

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5895	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5896	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5897	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5898	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5899	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5900	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Bronze Copper
Tharsalea hyllus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5053	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5054	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5055	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5056	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5057	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Bronze Copper's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, BE and L Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutger's University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M and J Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutger's University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Bronze Copper. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: .5 km.

Opler, PA and V Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin. New York, NY.

N/A

Scott, J. 1986. The butterflies of North America: a natural history and field guide. Stanford University Press. Stanford, CA.

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Brook Snaketail
Ophiogomphus aspersus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5949	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5950	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5951	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5952	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5953	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5954	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Brush-tipped Emerald
Somatochlora walshii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5955	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5956	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5957	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5958	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5959	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5960	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Checkered White
Pontia protodice

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5058	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5059	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5060	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5061	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5062	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Checkered White's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, BE and L Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutger's University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M and J Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutger's University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Checkered White. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, PA and V Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin. New York, NY.

N/A

Scott, J. 1986. The butterflies of North America: a natural history and field guide. Stanford University Press. Stanford, CA.

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Cobra Clubtail

Gomphurus vastus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5967	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5968	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5969	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5970	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5971	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5972	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Common Roadside-Skipper
Amblyscirtes vialis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8040	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8041	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8042	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8043	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8044	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning Common Roadside Skipper's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, N

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application].

Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: November 19, 2018).

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, N

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Compton Tortoiseshell
Nymphalis l-album

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8542	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8543	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8544	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8545	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8546	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning the Compton Tortoiseshell’s spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, N

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ

NatureServe. 2009. Acadian Hairstreak. In: NatureServe Explorer: An online encyclopedia

of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010)

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Coppery Emerald
Somatochlora georgiana

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5991	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5992	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5993	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5994	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5995	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5996	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Crimson-ringed Whiteface
Leucorrhinia glacialis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5997	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5998	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5999	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6000	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6001	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6002	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Dotted Skipper
Hesperia attalus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5134	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5135	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5136	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5137	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5138	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Dotted Skipper's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, BE and L Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutger's University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M and J Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutger's University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Dotted Skipper. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 5 km.

Opler, PA and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin. New York, NY.

N/A

Scott, J. 1986. The butterflies of North America: a natural history and field guide. Stanford University Press. Stanford, CA.

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Dusted Skipper

Atrytonopsis hianna

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8522	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8523	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8524	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8525	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8526	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning the Dusted Skipper’s spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ

NatureServe. 2009. Acadian Hairstreak. In: NatureServe Explorer: An online encyclopedia

of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010)

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY.

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Eastern Arogos Skipper
Atrytone arogos arogos

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4735	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
4736	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
4737	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
4738	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
4739	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Arogos Skipper's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, BE and L Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutger's University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M and J Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutger's University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Arogos Skipper. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

A good short distance and occasional long distance colonizer. Evidence that of this skipper can easily disperse several kilometers is overwhelming, and there is strong implication of larger movements at least in and near New Jersey.

Opler, PA and V Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin. New York, NY.

N/A

Scott, J. 1986. The butterflies of North America: a natural history and field guide. Stanford University Press. Stanford, CA.

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Eastern Beach Tiger Beetle

Habroscelimorpha dorsalis dorsalis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7843	Not applicable	Larvae Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
7844	Not applicable	Breeding/Courtship	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
7845	Not applicable	Occupied Habitat	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. For many species that value habitat patches in the Landscape Project maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In these cases, a default occurrence area (71.25 meter radius) is applied to take into account location uncertainty. These occurrence areas are used to value patches of habitat.

Literature:

N/A

N/A

Last researched by: Somes

Date researched: 1/1/2007

Insecta

Eyed Brown
Lethe eurydice

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8100	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8101	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8102	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8103	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8104	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning the Eyed Brown's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

NatureServe. 2009. Acadian Hairstreak. In: NatureServe Explorer: An online encyclopedia

of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Forcipate Emerald
Somatochlora forcipata

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6491	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6492	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6493	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6494	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6495	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6496	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Frosted Elfin

Callophrys irus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5063	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5064	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5065	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5066	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5067	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Frosted Elfin's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, BE and L. Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutger's University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutger's University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Frosted Elfin. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 2km. Small Baptisia or lupine patches within 2 or 3 km from substantial colonies are almost never unoccupied.

Opler, PA and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin. New York, NY.

N/A

Scott, J. 1986. The butterflies of North America: a natural history and field guide. Stanford University Press. Stanford, CA.

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Georgia Satyr

Neonympha aerolatus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5139	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5140	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5141	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5142	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5143	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Georgia Satyr's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, BE and L. Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutger's University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M and J Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutger's University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Helicta Satyr. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

N/A

Opler, PA and V Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin. New York, NY.

N/A

Scott, J. 1986. The butterflies of North America: a natural history and field guide. Stanford University Press. Stanford, CA.

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Golden-winged Skimmer
Libellula auripennis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5764	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5765	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5766	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5767	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5768	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5769	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Gray Comma
Polygonia progne

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8095	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8096	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8097	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8098	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8099	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning Gray Comma’s spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

NatureServe. 2009. Acadian Hairstreak. In: NatureServe Explorer: An online encyclopedia

of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Gray Petaltail

Tachopteryx thoreyi

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6093	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6094	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6095	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6096	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6097	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6098	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Green-faced Clubtail
Hylogomphus viridifrons

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6105	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6106	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6107	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6108	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6109	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6110	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Harpoon Clubtail

Phanogomphus descriptus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6123	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6124	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6125	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6126	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6127	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6128	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Harris's Checkerspot
Chlosyne harrisii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5144	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5145	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5146	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5147	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5148	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Harris' Checkerspot's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, B.E. and L. Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutgers University Press. New Brunswick, NJ

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Harris' Checkerspot. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 2 km

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

N/A

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

N/A

Last researched by: Somes

Date researched: 3/30/2010

Insecta

Hessel's Hairstreak

Callophrys hesseli

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5149	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5150	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5151	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5152	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5153	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Hessel’s Hairstreak’s spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, B.E. and L. Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutgers University Press. New Brunswick, NJ

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

N/A

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Hessel's Hairstreak. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

N/A

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

N/A

Last researched by: Somes

Date researched: 3/3/2010

Insecta

Hickory Hairstreak
Satyrium caryaevorus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8070	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8071	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8072	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8073	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8074	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning the Hickory Hairstreak's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

NatureServe. 2009. Acadian Hairstreak. In: NatureServe Explorer: An online encyclopedia

of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Hoary Elfin
Callophrys polios

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5154	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5155	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5156	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5157	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5158	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Hoary Elfin's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, BE and L Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutger's University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M and J Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutger's University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Hoary Elfin. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 2 km.

Opler, PA and V Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin. New York, NY.

N/A

Scott, J. 1986. The butterflies of North America: a natural history and field guide. Stanford University Press. Stanford, CA.

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Hudsonian Whiteface
Leucorrhinia hudsonica

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6129	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6130	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6131	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6132	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6133	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6134	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Kennedy's Emerald
Somatochlora kennedyi

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6497	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6498	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6499	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6500	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6501	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6502	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Leonard's Skipper
Hesperia leonardus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6551	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6552	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6553	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6554	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6555	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Leonard’s Skipper’s spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, B.E. and L. Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutgers University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Leonard's Skipper. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY.

N/A

Scott, J.A. 1986. The Butterflies of North America, a Natuarl History and Field Guide. Stanford University Press. Standford, CA.

N/A

Last researched by: Somes

Date researched: 3/30/2010

Insecta

Maine Snaketail
Ophiogomphus mainensis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6153	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6154	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6155	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6156	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6157	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6158	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Midland Clubtail

Gomphurus fraternus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6503	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6504	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6505	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6506	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6507	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6508	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Mitchell's Satyr
Neonympha mitchellii mitchellii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5043	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5044	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5045	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5046	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5047	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Mitchell's Satyr's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Barton, B.J. and C.E. Bach. 2005. Habitat Use by the Federally Endangered Mitchell's Satyr Butterfly (Neonympha mitchellii mitchellii) in a Michigan Prairie Fen. Am. Midl. Nat. 153:41-51.

The longest distances flown by males and females were 511.8 m and 344.8 m, respectively.

Beans, B.E. and L. Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutgers University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Mitchell's Satyr. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY.

N/A

Scott, J.A. 1986. The Butterflies of North America, a Natuarl History and Field Guide. Stanford University Press. Standford, CA.

N/A

Szymanski, J., Shuey, J.A., and K. Oberhauser. 2004. Population Structure of the Endangered Mitchell's Satyr, Neonympha mitchellii mitchellii (French): Implications for Conservation. Am. Midl. Nat. 152:304-322.

Maximum range estimates were 290 m and 420 m at the two sites.

Last researched by: Somes

Date researched: 3/30/2010

Insecta

Monarch
Danaus plexippus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8527	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8528	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8529	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8530	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8531	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning the Monarch’s spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

NatureServe. 2009. Acadian Hairstreak. In: NatureServe Explorer: An online encyclopedia

of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Myrina Fritillary

Boloria myrina myrina

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5068	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5069	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5070	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5071	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5072	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. Natureserve recommends a buffer of 2km when actual extent is unknown (Nartureserve 2010).

Due to the absence of literature concerning Silver-bordered Fritillary's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, B.E. and L. Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutgers University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

N/A

NatureServe. 2009.   Silver-bordered Fritillary. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 2km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY.

N/A

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

N/A

Last researched by: Somes

Date researched: 3/30/2010

Insecta

New England Bluet
Enallagma laterale

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6201	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6202	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6203	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6204	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6205	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6206	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Northern Metalmark
Calephelis borealis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5159	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5160	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5161	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5162	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5163	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Northern Metalmark's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, B.E. and L. Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutger's University Press. New Brunswick, NJ.

N/A

Bisignano, M. 2006. Northern Metalmark (Calephelis borealis) Habitat Restoration on Private Lands: 2005 Survey Results and Habitat Management Recommendations. Report to The New Jersey Chapter of the Nature Conservancy.

The maximum distance that adult metalmarks disperse is approximately 2,200 meters (~1.4 miles).

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY.

N/A

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutger's University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Northern Metalmark. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: .5 km.

Opler, P.A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin. New York, NY.

N/A

Scott, J. 1986. The butterflies of North America: a natural history and field guide. Stanford University Press. Stanford, CA.

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Northern Oak Hairstreak

Satyrium favonius ontario

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8547	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8548	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8549	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8550	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8551	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning the Northern Oak Hairstreak’s spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

NatureServe. 2009. Acadian Hairstreak. In: NatureServe Explorer: An online encyclopedia

of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Pepper and Salt Skipper

Amblyscirtes hegon

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8035	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8036	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8037	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8038	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8039	Not applicable	Breeding	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning Pepper and Salt Skipper's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application].

Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: November 19, 2018).

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Pine Barrens Bluet
Enallagma recurvatum

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6219	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6220	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6221	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6222	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6223	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6224	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Rapids Clubtail
Phanogomphus quadricolor

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6231	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6232	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6233	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6234	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6235	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6236	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Rare Skipper
Problema bulenta

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8025	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8026	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8027	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8028	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8029	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning the Rare Skipper's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

NatureServe. 2009. Acadian Hairstreak. In: NatureServe Explorer: An online encyclopedia

of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Robust Baskettail

Epitheca spinosa

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6255	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6256	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6257	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6258	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6259	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6260	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Rusty Patched Bumble Bee
Bombus affinis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8686	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

This species’ occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.
Due to the absence of literature concerning the spatial requirements for pollinating bees in New Jersey, 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease. Research has shown that several species of Bombus bees are capable of dispersing up to several kilometers to establish new colonies and over 500 meters for foraging purposes. Most species of pollinating bees are cable of traveling 500 meters in order to disperse and forage.

Literature:

ENSP Biologist Expert Opinion: R. Somes
N/A

Lepais, O., B. Darvill, S. O’Connor, J.L. Osborne, R.A. Sanderson, J. Cussans, L. Goffe, and D. Goulson. 2010. “Estimation of blumblee queen dispersal distances using sibship reconstruction method.” Molecular Ecology: 19:819-831.

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: November 19, 2018).

N/A

Osborne, J. L., S.J. Clark, R.J. Morris, I.H. Williams, J.R. Riley, A.D. Smith, D.R. Reynolds and A.S. Edwards. 1999. “A landscape-scale study of bumble bee foraging range and constancy, using harmonic radar”. Journal of Applied Ecology: 36: 519-533

Last researched by:	Somes
Date researched:	1/8/2019

Insecta

Sable Clubtail

Stenogomphurus rogersi

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6279	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6280	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6281	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6282	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6283	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6284	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Scarlet Bluet

Enallagma pictum

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6285	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6286	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6287	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6288	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6289	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6290	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Septima's Clubtail
Gomphurus septima

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6303	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6304	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6305	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6306	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6307	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6308	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Ski-tipped Emerald
Somatochlora elongata

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6309	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6310	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6311	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6312	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6313	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6314	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Sleepy Duskywing
Erynnis brizo

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8532	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8533	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8534	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8535	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
8536	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning the Sleepy Duskywing's spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

ENSP Biologist Expert Opinion: R. Somes

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey. A Guide to Their Status, Distribution, Conservation, and Appreciation. Rutgers University Press. New Brunswick, NJ.

NatureServe. 2009. Acadian Hairstreak. In: NatureServe Explorer: An online encyclopedia

of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A Guide to Eastern Butterflies. Houghton Mifflin Company. New York, NY

Scott, J.A. 1986. The Butterflies of North America, a Natural History and Field Guide. Stanford University Press. Standford, CA.

Last researched by: Somes

Date researched: 11/19/2018

Insecta

Spatterdock Darner
Rhionaeschna mutata

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6333	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6334	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6335	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6336	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6337	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6338	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Subarctic Darner
Aeshna subarctica

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6509	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6510	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6511	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6512	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6513	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6514	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Superb Jewelwing

Calopteryx amata

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6369	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6370	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6371	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6372	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6373	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6374	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Tiger Spiketail

Cordulegaster erronea

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6381	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6382	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6383	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6384	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6385	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6386	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Two-spotted Skipper
Euphyes bimacula

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5167	Not applicable	Casual Flyby	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5168	Not applicable	Pupae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5164	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5165	Not applicable	Nectaring	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
5166	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from other information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ.

Due to the absence of literature concerning Two-spotted Skipper’s spatial requirements, a 500-meter radius was formulated based upon the information available and the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program. Given the distances that these species are known to disperse, 500 meters is a highly conservative measure and based on minimum distance that these species are known to disperse with ease.

Literature:

Beans, B.E. and L. Niles. 2003. Endangered and Threatened Wildlife of New Jersey. Rutger’s University Press. New Brunswick, NJ.

N/A

ENSP Biologist Expert Opinion: R. Somes and D. Golden

N/A

Glassberg, J. 1999. Butterflies Through Binoculars, the East. Oxford University Press. New York, NY

N/A

Gochfeld, M. and J. Burger. 1997. Butterflies of New Jersey: a guide to their status, distribution, conservation, and appreciation. Rutger's University Press. New Brunswick, NJ.

N/A

NatureServe. 2009. Two-spotted Skipper. In: NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 17, 2010).

Inferred Minimum Extent of habitat use: 1 km.

Opler, P.A. and V. Malikul. 1998. A guide to eastern butterflies. Houghton Mifflin. New York, NY.

N/A

Scott, J. 1986. The butterflies of North America: a natural history and field guide. Stanford University Press. Stanford, CA.

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Williamson's Emerald
Somatochlora williamsoni

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6417	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6418	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6419	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6420	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6421	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6422	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Insecta

Zebra Clubtail
Stylurus scudderi

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6423	Not applicable	Breeding/Courtship	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6424	Not applicable	Exuviae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6425	Not applicable	Territorial Display	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6426	Not applicable	Foraging	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6427	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
6428	Not applicable	Larvae Sighting	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes

Justification:

For many species that value habitat patches in the Landscape Project Maps, insufficient information exists in the scientific literature to support the designation of an occurrence area. In the Landscape Project, an occurrence area equates to the area a species needs to fulfill it's life history requirements (breeding, resting, feeding). Due to the absence of literature concerning Odonate species' spatial requirements, a 500 meter radius was formulated based upon the expert opinion of the biologist responsible for reviewing these species within the NJ Endangered and Nongame Species Program.

Literature:

N/A

N/A

Last researched by: Golden

Date researched: 1/1/2006

Mammalia

Allegheny Woodrat
Neotoma magister

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4725	Not applicable	Capture Location	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4726	Not applicable	Live Individual Sighting	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4727	Not applicable	On Road	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
4728	Not applicable	Physical evidence	150 Meter Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes

Justification:

The preferred habitat of the Allegheny woodrat in NJ is rocky areas within deciduous forests. Woodrats make their dens, or middens, within the crevices and spaces between boulders at the base of cliffs or in rock outcrops. They forage in vegetated areas adjacent to their dens. The Indiana DNR (2007) states that Allegheny woodrats rarely travel more than 100 meters from their den sites. The PA Game Commission (2006) recommends that a 150 meter primary buffer be protected from the edge of the surface rock zone where the dens are located. The most comprehensive research to determine home range for Allegheny woodrats was conducted by Castleberry (2000) in the central Appalachians. Thirty-four woodrats were tracked using radio telemetry and the mean topographic home range was 4.4 ha. The maximum distance traveled from the den while foraging averaged 151 m.

Literature:

Butchkoski, C. 2006. Allegheny woodrat research/management. Annual Job Report. Project Code No. 06718, Job Code No. 71801. 27 pp.

Recommends a 150 meter primary buffer extending out from the edge of the surface rock zone.

Castleberry, S.B. 2000. Conservation and management of the Allegheny woodrat in the central Appalachians, Dissertation, West Virginia University, [On-line Abstract]. Available:https://kitkat.wvu.edu/etd/documentdata.eTD?documentid=1503

Thirty-four woodrats were radio tracked during 1998-99 and the mean home range was 4.4 ha.

Indiana Department of Natural Resources. 2007. The Allegheny woodrat (On-line). Accessed April 4, 2007 at: http://www.in.gov/dnr/fishwild/publications/lifeseries/wdrat.htm

States that Allegheny woodrats rarely travel farther than 100 meters from their dens.

Last researched by:	Valent
Date researched:	4/1/2007

Mammalia

Big Brown Bat
Eptesicus fuscus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7626	Nonbreeding	Inactive Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7627	Undetermined	Active Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7628	Hibernaculum	Hibernaculum	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7629	Maternity colony	Maternity Colony	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8502	Roost	Roost Site	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes

Justification:

Big brown bats are a widespread and adaptable species across north America. They are habitat generalists, using a variety of forest types (Krusic & Neefus 1996), open lands, and even town and city settings (Geggie & Fenton 1985) for roosting and foraging. Big brown bats commonly - even predominantly - roost in man-made structures (Whitaker & Grummer 1992, 2000). Distances travelled between day roosts and foraging areas average around 1.8 km (Brigham 1991) and reaches 5 km (Menzel et al. 2001), likely depending on the availability of their insect prey. We therefore apply a 2 km buffer size to maternity colonies, roosts, and active season sightings.

In winter, big brown bats are known to hibernate in caves and mines of relatively cool temperature, low humidity, and high air flow, and also to overwinter in buildings (Whitaker & Grummer 1992). Details about spring staging/fall swarming and foraging ranges surrounding hibernacula are lacking. Given this species' adaptability within natural and human-altered landscapes and its frequent use of buildings for hibernation, we apply a modest 2.0 km hibernaculum/inactive season buffer at this time.

Literature:

Agosta, Salvatore J. 2002. Habitat use, diet and roost selection by the Big Brown Bat (Eptesicus fuscus) in North America: a case for conserving an abundant species. Mammal Rev. 32:179-198.

Bats may use "night roosts" closer to feeding areas. They provide resting place to facilitate digestion.

Brigham, Mark R. 1991. Flexibility in foraging and roosting behaviour by the big brown bat (Eptesicus fuscus). Canadian Journal of Zoology. 69:117-121.

Big brown bats in British Colombia traveled an average of 1.8 km from day roosts to foraging area.

In Ontario, big brown bats roosting in manmade structures traveled less than 1 km to foraging area. The differences are most likely based on food availability.

Geggie, J.F. & Fenton, M.B. (1985) A comparison of foraging by Eptesicus fuscus (Chiroptera: Vespertilionidae) in urban and rural environments. Canadian Journal of Zoology, 63, 263-266.

N/A

Krusic, R.A. & Neefus, C.D. 1996. Habitat associations of bat species in the White Mountain National Forest. Bats and Forests Symposium, October 19-21, 1995, Victoria, British Columbia (Ed. By R. M. R. Barclay & R. M. Brigham), pp. 185-198. Working paper 23/1996.

N/A

Menzel, Michael A, T.C. Carter, L.R. Jablonowski, B.L. Mitchell, J.M. Menzel, and B.R. Chapman. 2001. Home range size and habitat use of big brown bats (Eptesicus fuscus) in a maternity colony located on a rural-urban interface in the southeast. The Journal of the Elisha Mitchell Scientific Society. 117:36-45.

Maximum foraging distance was about 5 km from maternal roosts (Article compared this to Brigham, 1991, 4.4 km maximum) for seven radio-tracked female big brown bats in the southeastern US. Contrary to other studies, bats travelled further from the roost during lactation, possibly to find enough prey to meet the energy demands of lactation. The mean home range size was 2,906 hectares.

Whitaker, J.O. Jr & Gummer, S.L. 1992. Hibernation of the big brown bat, Eptesicus fuscus, in buildings. Journal of Mammalogy, 73, 312-316.

In buildings, the presence of heating helps to maintain temperatures above freezing that allow big brown bats to survive. Buildings used by maternity colonies are not always used as hibernacula, and vice versa.

Whitaker, J.O. Jr & Gummer, S.L. 2000. Population structure and dynamics of big brown bats (Eptesicus fuscus) hibernating in buildings in Indiana. American Midland Naturalist, 143, 389-396.

N/A

Last researched by: Hall

Date researched: 7/17/2015

Mammalia

Bobcat

Lynx rufus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4752	Not applicable	Capture Location	2.82 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4753	Not applicable	Live Individual Sighting	2.82 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4754	Not applicable	On Road	2.82 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4755	Not applicable	Physical evidence	2.82 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8359	Not applicable	Telemetry: Home Range	Kernel Home Range	Apply a buffer	Convert to a point and buffer	Stays as is	Yes

Justification:

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 mean home range size of bobcats collered in the northwestern region of the state between 2002 and 2016 (N = 6 females, N = 5 males) was 72 km2 with a range of 23 km2 to 168 km2. The mean core area of the home ranges (50% kernel) was 9.4 km2. Similarly, home ranges reported across the northeast have varied considerably (Broman et al. 2014, Donovan et a. 2011, Lovallo 2000, Reed et al. 2017). We apply a 25 km2 buffer (2.82 km radius) around bobcat sightings, which is larger than the core area we estimated for male and female bobcats in the state, and midway between the male and female home range sizes Lovallo (2000) estimated in north central Pennsylvania. It is a conservative estimate based on sizes reported for bobcats in the northeastern United States.

Literature:

Broman, D. J. A., J. A. Litvaitis, M. Ellingwood, P. Tate, and G. C. Reed. 2014. Modeling bobcat Lynx rufus habitat associations using telemetry locations and citizen-scientist observations: are the results comparable? Wildlife Biology 20:229-237.

Female in NH, 29.7km2.

Conner, M., B. Plowman, B.D. Leopold, C. Lovell. 1999. Influence of time-in-residence on home range and habitat use of bobcats. Journal of Wildlife Management 63(1):261-269.

In east central Mississippi the male home range was 15.34 + 2.12 km2 and 15.67 + 2.61 km2 in consecutive years. The female annual home range was 7.81 + .91 km2 and 6.40 + .57 km2 in consecutive years

Donovan, T. M., M. Freeman, H. Abouelezz, K. Royar, A. Howard, and R. Mickey. 2011. Quantifying home range habitat requirements for bobcats (Lynx rufus) in Vermont, USA. Biological Conservation 144:2799-2809.

Average home range size was 57.3 km2 (71 km2 based on 10 males, and 23 km2 based on 4 females) in Vermont.

Litvaitis, J.A., J.A. Sherburne, J.A. Bissonette. 1986. Bobcat habitat use and home range size in relation to prey density. Journal of Wildlife Management 50(1):110-117.

In Maine the average home range size of males was 95.7 km2 and that of females was 31.2 km2.

Lovallo, J.M. 1999. Multivariate models of bobcat habitat selection for Pennsylvania Landscape. Ph.D. dissertation. The Pennsylvania State University, University Park. 146pp.

Attributes the highly variable home range estimates of both males and females to the patchy distribution of suitable habitat components.

Lovallo, M.J. 2000. Bobcat home range size and intraspecific social relationships. Pennsylvania Game Commission Bureau of Wildlife Management Research Division Project Annual Job Report: Bobcat Research/Management 06630.

Median female home range was 16 km2 (MCP) and median male home range was 42 km2 (MCP). Lovallo (2000) also summarizes other home range sizes in the northeastern U.S. as being 36-326 km2 for males in New York State, 71-112 km2 for males in Massachusetts, and 28-33 km2 for females in Maine.

Lovallo, M.J., E.M. Anderson. 1996. Bobcat (Lynx rufus) home range size and habitat use in northwest Wisconsin. American Midland Naturalist 135(2): 241-252.

In northwestern Wisconsin the annual male home ranges were 60.4 km2 + 23.4 km2 and the female home ranges were 28.5 km2 + 3.7 km2.

Reed, G. C., J. A. Litvaitis, C. Callahan, R. P. Carroll, M. K. Litvaitis, and D. J. A. Broman. 2017. Modeling landscape connectivity for bobcats using expert-opinion and empirically derived models: how well do they work? Animal Conservation 20:308-320.

Average home range size of five females in New Hampshire was 23.8km2.

Last researched by: Fowles

Date researched: 12/20/2019

Mammalia

Bottlenose Dolphin
Tursiops truncatus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7795	Not applicable	Stranding	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
7796	Not applicable	Live Individual Sighting	6.5 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7797	Not applicable	Foraging Area	6.5 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7798	Not applicable	Calving or nursing area	6.5 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8464	Not applicable	Small Pod Sighting	6.5 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8465	Not applicable	Large Pod Sighting	6.5 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Most bottlenose dolphins found in New Jersey waters (within 3 nautical miles of the shoreline) are of the coastal, northern migratory stock. Individuals within the coastal stock have smaller home ranges than those of the offshore variety. This justification, therefore, is written based upon use for the less wide-ranging coastal stock and is more conservative than it would be for offshore bottlenose dolphins.

Groups comprised of females or females with young typically exhibit seasonal fidelity to their home range, which often overlap with the home ranges of other groups. Groups of males are generally more wide-ranging and exhibit less site fidelity. Also, some members of a population may have either a smaller, larger, or completely different home range than other dolphins within the same population (Brown 2007, Defran et al. 1999, Zolman 2002). In addition, some studies have found that some populations of bottlenose dolphins will rarely leave their home range while other studies have found populations that make trips hundreds of miles away from their suspected home range (Wursig 1978, Wells 1986). Factors presumably affecting the degree of site fidelity to specific locations and size of home range include habitat suitability, predation risk, prey availability, and environmental features such as temperature and salinity (Brown 2007).

The coastal stock apparently has a more limited home range along each segment of the coast within shallow coastal waters near estuaries than along more dynamic, less estuarine coastlines. For example, resident dolphins in a South Carolina estuary had home ranges over four years that averaged 51.3 square kilometers (95% adaptive kernel method; Gubbins 2002). However, in the Southern California Bight, dolphins are highly mobile within a relatively narrow coastal zone, extending from at least Santa Barbara to Ensenada, Mexico (Defran et al. 1999). Due to New Jersey's coastline being more similar both geologically and oceanographically to South Carolina and Florida than to the U.S. west coast, the home range area chosen is based upon studies conducted in those areas. Taking an average of the home range areas discussed in

Gubbins (2002), Shane, et al. (1986), and Urian et al. (2009), a home range size of 133 square kilometers is suggested until further studies can provide more insight. Given that this is a highly mobile marine species, the figure is likely very conservative and results in an SOA radius size of 6.5 km.

Literature:

Brown, Jacalyn Toth. 2007. Aspects of the Ecology of Bottlenose Dolphins (Tursiops truncatus) in New Jersey. M.S. thesis. Rutgers, The State University of New Jersey. 102 pp.

N/A

Defran, R.H., D.W. Weller, D.L. Kelly, and M.A. Espinosa. 1999. Range Characteristics of Pacific Coast Bottlenose Dolphins (Tursiops truncates) in the Southern California Bight. Marine Mammal Science 2: 381-393.

Minimum range estimates of bottlenose dolphins within the Southern California Bight were 50 and 470 km. These data suggest that bottlenose dolphins within the Southern California Bight are highly mobile within a relatively narrow coastal zone. The unique range characteristics documented during this study may reflect the highly dynamic nature of this coastal ecosystem and the associated patchy distribution of food resources available to these bottlenose dolphins.

Gubbins, C. 2002. Use of home ranges by resident bottlenose dolphins (Tursiops truncatus) in a South Carolina estuary. Journal of Mammalogy 83:178-187.

Bottlenose Dolphins (Tursiops truncatus) that were resident in a South Carolina estuary had relatively small home ranges (mean 51.3 square kilometers, 95% adaptive kernel method).

Shane, S.H., R.S. Wells, and B. Wursig. 1986. Ecology, behavior and social organization of the bottlenose dolphins: a review. Marine Mammal Science 2:34- 63.

On the west coast of Florida, most resident bottlenose dolphins keep to a home range of about 85 square kilometers. Female-calf pairs and subadult males had home ranges averaging approximately 40 square kilometers, whereas other adult females, subadult females and adult males had smaller ranges (15-20 square kilometers). Coastal bottlenose dolphins move with concentrations of food, move into shallow safe areas, move with or against the tide and show some regular (but usually not strong) diurnal movement patterns. The overriding theme is variability.

Urian, Kim W., S. Hofmann, R.S. Wells, A.J. Read. 2009. Fine-scale population structure of bottlenose dolphins (Tursiops truncatus) in Tampa Bay, Florida. Marine Mammal Science 3:619-638.

Community home ranges, estimated using the kernel method, and the 50% kernel contour to describe the animal's core area, averaged 65 square kilometers (range 5 - 145 square kilometers). The 95% kernel contour averaged 264 square kilometers (range 29 - 529 square kilometers).

Wells, R.S. 1986. Population structure of bottlenose dolphins: behavioral studies along the central west coast of Florida. Report to National Marine Fisheries Service-SEFSC. Contract Number 45-WCNF-5-00366. 58 pp.

N/A

Wursig, B. 1978. Occurrence and group organization of Atlantic bottlenose porpoises (Tursiops truncatus) in an Argentine Bay. Biological Bulletin 154: 348-359.

N/A

Zolman, E.S. 2002. Residence patterns of bottlenose dolphins (Tursiops truncatus) in the Stono River Estuary, Charleston County, South Carolina, U.S.A. Marine Mammal Science 18:879-892.

N/A

Last researched by: Davenport

Date researched: 3/1/2010

Mammalia

Eastern Red Bat
Lasiurus borealis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7632	Maternity colony	Maternity Colony	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7633	Undetermined	Active Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7637	Nonbreeding	Inactive Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8494	Hibernaculum	Hibernaculum	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8504	Roost	Roost Site	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes

Justification:

In summer, eastern red bats are known to roost individually among the foliage of tree canopies. They have also been observed roosting in dense grass or vines, beneath the shingles of buildings, and in leaf litter (Mager & Nelson 2001). The maximum distances travelled between day roosts and foraging areas are about 5.5 km for females and 7.4 km for males (Maxell 2015); the average is around 2 km (Elmore et al. 2005; Lacki et al. 2007; Maxell 2015). We therefore apply a 2 km buffer size to maternity colonies, roosts, and active season sightings. Red bats use forest openings for foraging and travel (O'Keefe et al. 2009).

Eastern red bats are a migratory species, with many traveling south of NJ for winter. Male eastern red bats do not migrate as far south as females and are more likely to remain in the north-central part of their range (Cryan 2003, Dunbar & Tomasi 2006). The bats roost in trees during warmer winter days, then move down into the leaf litter during colder days (Dunbar & Tomasi 2006). Details about the migration and hibernation habits of eastern red bats in NJ are scarce, but given that the species is primarily migratory, solitary, and adaptable in its winter roost selection, we apply the same 2.0 km buffer to hibernaculum/inactive season sightings as is used for roost sites and active season sightings at this time.

Literature:

Cryan, Paul M. 2003. Seasonal distribution of migratory tree bats (Lasiurus and Lasionycteris) in North America. Journal of Mammalogy. 84: 579-593.

Male eastern red bats do not migrate as far south as females do and tend to stay in the northern-central part of the range. Concentrations of eastern red bats north of New York along the coastline suggest a coastal migration path south.

Dunbar, Miranda B. and T.E. Tomasi. 2006. Arousal patterns, metabolic rate, and an energy

budget of eastern red bats (Lasiurus borealis) in winter. Journal of Mammalogy. 87:1096-1102.

Male eastern red bats are common in the northern part of their range through the winter months. The bats remain in trees during relatively warm winter days, then move into leaf litter during colder days. The leaf litter creates a stable microhabitat, allows for conservation of energy, and provides camouflage.

Elmore, Leslie W., D.A. Miller, and F.J. Vilella. 2005. Foraging Area Size and Habitat Use by Red Bats (Lasiurus borealis) in an Intensively Managed Pine Landscape in Mississippi. The American Midland Naturalist. 153:405-416.

The average maximum distance travelled from diurnal roosts to foraging sites ranged from 0.19 km-2.85 km for adult females, 0.64 km-3.28 km for adult males, 0.99 km-1.64 km for juvenile females and 0.48 km-1.02 km for juvenile males.

Lacki, Michael J., J.P. Hayes, and A. Kurta. 2007. Bats in Forests: Conservation and Management. JHU Press.

The maximum length of commuting distance to foraging site was reported as 7.4 km.

Mager, Kenneth J. and T.A. Nelson. 2001. Roost site selection by eastern red bats (Lasiurus borealis). The American Midland Naturalist. 145:120-126.

Eastern red bats in Illinois were found roosting in mature trees, dense grass, shingles of buildings, and in leaf litter. Most roosts were in the trunks or foliage of large deciduous trees.

Maxell, Bryce A. 2015. Overview of Roosting Habitat and Home Range / Foraging Distance Documented for Montana Bats. Montana Natural Heritage Program. Helena, MT. 27 pp.

Maximum distances traveled from diurnal roosts to foraging areas ranged from 1.2 to 5.5 km for females and 1.4 to 7.4 km for males in Montana.

O'Keefe, Joy M., S.C. Loeb, J.D. Lanham, and H.S. Hill Jr. 2009. Macrohabitat factors affect day roost selection by eastern red bats and eastern pipistrelles in the southern Appalachian Mountains, USA. Forest Ecology and Management. 257:1757-1763.

Red bat roosts were found an average of 71 m -158 m away from forest openings. The bats most likely used these openings for foraging and travel.

Last researched by: Hall

Date researched: 7/18/2015

Mammalia

Eastern Small-footed Myotis
Myotis leibii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5822	Undetermined	Active Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
5823	Maternity colony	Maternity Colony	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
5824	Hibernaculum	Hibernaculum	4.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
5828	Nonbreeding	Inactive Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8506	Roost	Roost Site	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes

Justification:

Eastern small-footed bats roost in the crevices of talus slopes, rock fields, and cliff faces during the summer. Both males and females change roost sites often, even daily, although the roosts are typically within short distances of each other (Johnson et al. 2011). Eastern small-footed bats use ridgelines, streams, and forested roads as travel corridors between roosts and foraging areas, which have been found to range from 0.8 to 13.2 km (0.5 to 8.2 mi) apart (Chenger 2003, pp. 14-23; Chenger 2008b, p. 6; Johnson et al. 2009, p. 3; Mumma and Capouillez 2011, p. 24). Johnson et al. 2009 (p. 3) found that four radio-tracked eastern small-footed bats foraged within 1.8 km of their day roosts. We use roughly the average distance, 2 km, as the buffer size for maternity colonies, roosts, and active season sightings.

Eastern small-footed bats overwinter in caves and abandoned mines within proximity to their summer ranges. They have been observed migrating as far as 19 km (12 mi) (Hitchcock 1955, p. 31) and as little as 0.1 km (0.06 mi) from their hibernacula to summer roost sites (Johnson and Gates 2008, p. 456). The distance traveled is probably influenced by the availability of hibernacula and roosting sites across the landscape (Johnson and Gates 2008, p. 457). Due to a paucity of published information on spring staging/fall swarming and foraging ranges surrounding hibernacula, we refer to the information available on the closely related Indiana bat (Myotis sodalis), and therefore apply the same 4 km hibernaculum buffer and 2 km inactive season buffer at this time.

Literature:

Chenger, J. 2003. Bat inventory for project lands of the upper Connecticut river basin. Prepared for: U.S. Army Corps of Engineers New England District, Concord, Massachusetts. 109 pp.

N/A

Chenger, J. 2008b. Summer woodland bat survey Dunning Mountain wind 2008. Prepared for: Iberdrola Renewables, Portland, Oregon. 28pp.

N/A

Hitchcock, H.B. 1955. A summer colony of the least bat Myotis subulatus leibii (Audubon and Bachman). Canadian Field Naturalist 69: 31.

N/A

Johnson, J.B., J.E. Gates, and W.M. Ford. 2009. Notes on foraging activity of female Myotis leibii in Maryland. Res. Pap. NRS-8. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northern Research Station. 8 p.

Observed home range varied from 10.2 to 1,405 hectares (25 to 3,472 acres) (p.3).

Johnson, J.B.; Gates, J.E. 2008. Spring migration and roost selection of female Myotis leibii in Maryland. Northeastern Naturalist. 15: 453-460.

N/A

Johnson, J.S. et al. 2011. Day-roosts of Myotis leibii in the Appalachian Ridge and Valley of West Virginia. Northeastern Naturalist 18(1): 95-106.

Five lactating female bats and five non-reproductive males were radio-tracked; it was observed that females and males switched roosts on average every 1.1 days. Males traveled an average of 41 m (135 ft) between consecutive roosts, while females traveled an average of 67 m (218 ft) between consecutive roosts.

Kiser, J.D. and C.L. Elliott. 1996. Foraging habitat, food habits, and roost tree characteristics of the Indiana bat (Myotis sodalis) during autumn in Johnson County, Kentucky. Final report, Kentucky Dept. of Fish and Wildl. Resources, Frankfort, Kentucky. 65 pp.

In Kentucky, Kiser and Elliott found male Indiana bats roosting primarily in dead trees on upper slopes and ridgetops within 2.4 km of their hibernaculum. In the fall, male Indiana bats tend to roost and forage in upland and ridgetop forests, but may also forage in valley and riparian forest; movements of 2.5-6.8 km have been reported in Kentucky and Missouri.

Mumma, T.L. and W. Capouillez. 2011. Pennsylvania Game Commission Wind Energy Voluntary Cooperation Agreement - Second Summary Report. Pennsylvania Game Commission. 67 p.

Core habitat for three male and two female eastern small-footed bats ranged from 4 to 75 ha (10 to 185 ac) (50 percent fixed kernel utilization distribution) (p. 25).

Stihler, C. West Virginia Division of Natural Resources, pers observ. October 1996. Reference excerpted from USFWS Indiana Bat Revised Recovery Plan, March 1999.

During September in West Virginia, male Indiana bats roosted within 5.6km [of hibernacula] in trees near ridgetops, and often switched roost trees from day to day.

US Fish and Wildlife Service. 2013. Endangered and threatened wildlife and plants; 12-month finding on a petition to list the eastern small-footed bat and the northern long-eared bat as endangered or threatened species. 78(191):61046-61080.

N/A

Last researched by: Hall

Date researched: 6/1/2015

Mammalia

Fin Whale
Balaenoptera physalus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7730	Not applicable	Stranding	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
7731	Not applicable	Foraging Area	25 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7733	Not applicable	Live Individual Sighting	25 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The baleen whales which occur off the NJ coast are, for the most part, migrating between summer feeding grounds in the north and winter breeding and/or calving grounds in the south. Foraging has been documented for humpback whales off the NJ coast and may also be engaged in by fin whales, but the bulk of foraging behavior occurs farther north and perhaps offshore (foraging in NJ waters may be opportunistic). Northern Right Whales, whose preferred diet consists of calanoid copepods, are not thought to feed in NJ waters. Movements are patterned and consistent, but movements of individuals in a given year may vary according to their energetic and reproductive condition, climatic factors, etc. Thus, due to the migratory behavior of these species in NJ waters, as well as the tremendous distance which they are capable of traveling within relatively short spans of time (Mate 1999; NMFS 1991; Watkins 1996), formulating a Species Occurrence Area (SOA) based upon a home range is both impractical and inappropriate for an area which primarily functions as a migratory corridor. However, in order to provide a basis by which these species may best be represented within the current SOA framework, the documented average daily distance traveled will be used to determine the SOA radius. Due to the paucity of data regarding migratory movements of baleen whales between summering and wintering grounds in the northwest Atlantic, an extremely conservative SOA radius of 25 km was chosen.

Literature:

Mate, Bruce R., and B.A. Lagerquist. 1999. Movements of North Pacific blue whales during the feeding season off southern California and their southern fall migration. Marine Mammal Science 15(4): 1246-1257.

The satellite-acquired locations of 10 blue whales tagged with Argos radio tags indicated an overall average speed of individual whales ranging from 58 to 172km/day. Migratory individuals covered greater average distance as opposed to clustered or foraging movements.

Merrick, Richard L., P.J. Clapham, T. Cole, P. Gerrior, and R.M. Pace III. 2001. Identification of Seasonal Area Management Zones for North Atlantic Right Whale Conservation. Northeast Fisheries Science Center Reference Document 01-14.

Within the northern right whale’s summer foraging habitat, the size of an area necessary to contain a right whale’s movement over a 1-2 week period was calculated to be a 15 nautical mile (27.78) radius.

National Marine Fisheries Service. 1991. Recovery Plan for the Humpback Whale (Megaptera novaeangliae). Prepared by the Humpback Whale Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 105 pp.

Estimated migration speeds of humpback whales migrating between summering and wintering areas were: 78 days (2.38 km/hr) for a 4,500 km distance between Hawaii and Alaska; and 3.29 km/hr and 2.28 km/hr for two individuals migrating between the Greater Antilles and Massachusetts Bay.

Watkins, William A., J. Sigurjonsson, D. Wartzok, R.R. Maiefski, P.W. Howey, and M.A. Daher. 1996. Fin whale tracked by satellite off Iceland. Marine Mammal Science 12(4): 564-569.

The average daily distance of a fin whale tagged with a satellite transmitter was 36 km (range 1.9 km - 156.6 km, median 23 km) over a period of 45 days.

Last researched by: Davenport

Date researched: 1/1/2007

Mammalia

Harbor Porpoise

Phocoena phocoena

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7839	Not applicable	Stranding	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
7840	Not applicable	Foraging Area	17.5 km Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
7841	Not applicable	Live Individual Sighting	17.5 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8484	Not applicable	Small Pod Sighting	17.5 km Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes
8485	Not applicable	Large Pod Sighting	17.5 km Buffer	Apply a buffer	Convert to a point and buffer	Stays as is	Yes

Justification:

The harbor porpoise is the smallest cetacean present in New Jersey waters. It is present primarily during winter months and the state's waters may, in fact, serve as critical winter habitat (Westgate et al. 1998). This species is very inconspicuous and difficult to observe at sea due to its small size, limited time at the surface, and wariness. As a small endothermic predator with limited energy storage capacity, it is assumed that harbor porpoises must feed frequently without prolonged periods of fasting. Consequently, their distribution and movements should essentially follow those of their prey, as suggested by satellite tracking studies. There is very little information available for home ranges of harbor porpoises within the Mid-Atlantic region. It is known that, throughout their range within the temperate northern hemisphere, they may utilize home ranges which span thousands of square miles (Reeves et al. 2002). However, in order to provide a basis by which this species may best be represented within the current SOA framework, the average linear coastal extent of two areas within New Jersey waters occupied by a tracked porpoise in Westgate et al. (1998) was calculated at approximately 35 kilometers. Therefore, an extremely conservative SOA radius of 17.5 km was chosen.

Literature:

Read, A. L. and A. J. Westgate. 1997. Monitoring the movements of harbour porpoises (Phocoena phocoena) with satellite telemetry. Marine Biology 130:315–322.

Eight porpoises were tracked using satellite telemetry. Estimates of daily distance traveled were similar for all porpoises (13.9 to 28.1 km) with the exception of one individual which had a mean daily distance of 58.5 km. When the movements of tagged individuals are examined at their largest scale, it is clear that the home range of the harbor porpoises tracked within this study occupied most of the Gulf of Maine.

Reeves, Randall R., B.S. Stewart, P.J. Clapham, and J.A. Powell. 2002. National Audubon Society Guide to Marine Mammals of the World. Alfred A. Knopf. New York.

Individuals are highly mobile, using home ranges of thousands of square miles and often traveling many miles per day.

Westgate, A. J., A. J. Read, T. M. Cox, T. D. Schofield, B. R. Whitaker and K. E. Anderson. 1998. Monitoring a Rehabilitated Harbor Porpoise Using Satellite Telemetry. Marine Mammal Science. 14(3): 599-604.

A harbor porpoise which stranded in New Jersey was rehabilitated and released with a satellite-linked transmitter. Upon release, the porpoise showed three distinct movement patterns, one of which occurred in New Jersey waters. The porpoise remained in the nearshore region for nearly four weeks, milling along the coast of New Jersey and outside the approaches to New York City. The porpoise milled within two separate areas along the New Jersey shoreline: along Long Beach Island and along the Monmouth County Atlantic Ocean shoreline extending into Raritan Bay.

Last researched by: Davenport

Date researched: 2/1/2010

Mammalia

Humpback Whale
Megaptera novaeangliae

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7738	Nonbreeding	Foraging Area	25 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7739	Nonbreeding	Stranding	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
7741	Nonbreeding	Live Individual Sighting	25 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The baleen whales which occur off the NJ coast are, for the most part, migrating between summer feeding grounds in the north and winter breeding and/or calving grounds in the south. Foraging has been documented for humpback whales off the NJ coast and may also be engaged in by fin whales, but the bulk of foraging behavior occurs farther north and perhaps offshore (foraging in NJ waters may be opportunistic). Northern Right Whales, whose preferred diet consists of calanoid copepods, are not thought to feed in NJ waters. Movements are patterned and consistent, but movements of individuals in a given year may vary according to their energetic and reproductive condition, climatic factors, etc. Thus, due to the migratory behavior of these species in NJ waters, as well as the tremendous distance which they are capable of traveling within relatively short spans of time (Mate 1999; NMFS 1991; Watkins 1996), formulating a Species Occurrence Area (SOA) based upon a home range is both impractical and inappropriate for an area which primarily functions as a migratory corridor. However, in order to provide a basis by which these species may best be represented within the current SOA framework, the documented average daily distance traveled will be used to determine the SOA radius. Due to the paucity of data regarding migratory movements of baleen whales between summering and wintering grounds in the northwest Atlantic, an extremely conservative SOA radius of 25 km was chosen.

Literature:

Mate, Bruce R., and B.A. Lagerquist. 1999. Movements of North Pacific blue whales during the feeding season off southern California and their southern fall migration. Marine Mammal Science 15(4): 1246-1257.

The satellite-acquired locations of 10 blue whales tagged with Argos radio tags indicated an overall average speed of individual whales ranging from 58 to 172km/day. Migratory individuals covered greater average distance as opposed to clustered or foraging movements.

Merrick, Richard L., P.J. Clapham, T. Cole, P. Gerrior, and R.M. Pace III. 2001. Identification of Seasonal Area Management Zones for North Atlantic Right Whale Conservation. Northeast Fisheries Science Center Reference Document 01-14.

Within the northern right whale's summer foraging habitat, the size of an area necessary to contain a right whale's movement over a 1-2 week period was calculated to be a 15 nautical mile (27.78) radius.

National Marine Fisheries Service. 1991. Recovery Plan for the Humpback Whale (Megaptera novaeangliae). Prepared by the Humpback Whale Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 105 pp.

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Watkins, William A., J. Sigurjonsson, D. Wartzok, R.R. Maiefski, P.W. Howey, and M.A. Daher. 1996. Fin whale tracked by satellite off Iceland. Marine Mammal Science 12(4): 564-569.

The average daily distance of a fin whale tagged with a satellite transmitter was 36 km (range 1.9 km - 156.6 km, median 23 km) over a period of 45 days.

Last researched by: Davenport

Date researched: 1/1/2007

Mammalia

Indiana Myotis
Myotis sodalis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4781	Hibernaculum	Hibernaculum	4.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
4782	Nonbreeding	Inactive Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
4783	Maternity colony	Maternity Colony	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
4786	Undetermined	Active Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8509	Roost	Roost Site	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes

Justification:

Fall roosting and foraging distance from hibernacula ranged from 2.4km-6.8km with an average distance of 4.33km. A 4km radius buffer was therefore selected to protect foraging and roosting habitat surrounding hibernacula. Summer roosting and foraging distances ranged from 0.679km-5km to create an average radius buffer of 2km.

Literature:

Callahan, E.V., R.D. Drobney, and R.L. Clawson. 1997. Selection of summer roosting sites by Indiana bats (Myotis sodalis) in Missouri. J. Mamm. 78:818-825.

The furthest distance documented between roosts occupied by bats within a single maternity colony was 5 km.

Gardner, J.E., J.D. Garner, and J.E. Hofmann. 1991a. Summer roost selection and roosting behavior of Myotis sodalis (Indiana bat) in Illinois. Unpublished report, Illinois Natural History Survey, Champaign, Illinois.

Radiotelemetry showed that during the maternity period, home range of Indiana bats is generally no larger than 2 km in breadth.

Gardner, J.E., J.D. Garner, and J.E. Hofmmann. 1991b. Summary of Myotis sodalis summer habitat studies in Illinois: with recommendations for impact assessment. Special Report. Illinois Natural History Survey, Illinois Dept. of Conservation. Champaign, Illinois. 28 pp.

Stream, associated with floodplain forests, and impounded bodies of water are preferred foraging habitats for pregnant and lactating Indiana bats, some of which may fly up to 2.5 km from upland roosts. Mean distance moved by reproductively active females between foraging and roosting habitat was 1.04 km. Maximum distance moved by reproductively active females between foraging and roosting habitat was 2.40 km.

Kiser, J.D. and C.L. Elliott. 1996. Foraging habitat, food habits, and roost tree characteristics of the Indiana bat (Myotis sodalis) during autumn in Johnson County, Kentucky. Final report, Kentucky Dept. of Fish and Wildl. Resources, Frankfort, Kentucky. 65 pp.

In Kentucky, Kiser and Elliott found male Indiana bats roosting primarily in dead trees on upper slopes and ridgetops within 2.4 km of their hibernaculum. In the fall, male Indiana bats tend to roost and forage in upland and ridgetop forests, but may also forage in valley and riparian forest; movements of 2.5-6.8 km have been reported in Kentucky and Missouri.

Menzel, J.M., W.M. Ford, M.A. Menzel, T.C. Carter, J.E. Gardner, J.D. Garner, J.E. Hofmann. 2005. Summer habitat use and home-range analysis of the endangered Indiana bat. Journal of Wildlife Management 69(1):430-436.

Home ranges were determined from radio telemetry of 7 female and 4 male Indiana bats in Illinois. No significant differences were found in home-range size between male and female bats or between study years. The mean home-range size for the Indiana bats tracked was 144.7 ha, which calculates to a radius of 0.679 km.

Stihler, C. West Virginia Division of Natural Resources, pers observ. October 1996. Reference excerpted from USFWS Indiana Bat Revised Recovery Plan, March 1999.

During September in West Virginia, male Indiana bats roosted within 5.6km [of hibernacula] in trees near ridgetops, and often switched roost trees from day to day.

Last researched by: Craddock

Date researched: 6/1/2006

Mammalia

Little Brown Myotis
Myotis lucifugus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7590	Undetermined	Active Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7592	Maternity colony	Maternity Colony	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7594	Hibernaculum	Hibernaculum	4.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7596	Nonbreeding	Inactive Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8507	Roost	Roost Site	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes

Justification:

Little brown bats form maternity colonies in springtime in tree cavities and man-made structures like attics and barns. These colonies range in size from tens to hundreds - even thousands - of individuals. The foraging range for pregnant females can exceed 30 hectares; minimum flight distances between day roosts and foraging areas along forest edges and water bodies have been found to be between 1.7-2.6 km (+ 0.6 km), with distances being less during lactation compared to pregnancy (Henry et al. 2002). We therefore apply a 2 km buffer size to maternity colonies, roosts, and active season sightings.

In the late summer or fall, little brown bats begin migrating through a variety of transient roosts (Fenton and Barclay 1980) before arriving at winter hibernacula located up to 300 km from summer roosts (Davis and Hitchcock 1965; Fenton 1970; Griffin 1970; Humphrey and Cope 1976), or farther. Hibernacula are selected for their high humidity and relatively stable, above-freezing temperatures (Humphrey and Cope 1976). Due to a paucity of published information on spring staging/fall swarming behavior of the little brown bat and its foraging range surrounding hibernacula, we refer to the information available on the Indiana bat (Myotis sodalis), which shares a similar life history, and therefore apply the same 4 km hibernaculum buffer and 2 km inactive season buffer at this time.

Literature:

Davis, W. H., and H.B. Hitchcock. 1965. Biology and migration of the bat, Myotis lucifugus, in New England. Journal of Mammalogy, 46: 296-313.

N/A

Fenton, M.B., and R.M.R. Barclay. 1980. Myotis lucifugus. 142 Mammalian Species, pp. 1-8.

N/A

Griffin, D. R. 1970. Migration and homing in bats. Pp. 233-264, In Biology of Bats, Vol. 2 (W. A. Wimsatt, ed.). Academic Press, New York, 477 pp.

N/A

Henry, M., D.W. Thomas, R. Vaudry, and M. Carrier. 2002. Foraging distances and home range of pregnant and lactating little brown bats (Myotis lucifugus). Journal of Mammalogy, 83: 767-774.

Based on radio-telemetry of 53 adult female little brown bats in Quebec, Canada, the foraging range for pregnant little brown bats can exceed 30 hectares, but this range decreases during lactation when the females return to the roost to suckle their young between feeding bouts. This results in shorter minimum flight distances, from 2.6 + 0.6 km during pregnancy to 1.7 + 0.6 km during lactation.

Humphrey, S. R., and J. B. Cope. 1976. Population ecology of the little brown bat, Myotis lucifugus, in Indiana and north-central Kentucky. Special Publications, American Society of Mammalogists, 4: 1-81.

N/A

Kiser, J.D. and C.L. Elliott. 1996. Foraging habitat, food habits, and roost tree characteristics of the Indiana bat (Myotis sodalis) during autumn in Johnson County, Kentucky. Final report, Kentucky Dept. of Fish and Wildl. Resources, Frankfort, Kentucky. 65 pp.

In Kentucky, Kiser and Elliott found male Indiana bats roosting primarily in dead trees on upper slopes and ridgetops within 2.4 km of their hibernaculum. In the fall, male Indiana bats tend to roost and forage in upland and ridgetop forests, but may also forage in valley and riparian forest; movements of 2.5-6.8 km have been reported in Kentucky and Missouri.

McGuire, L.P., M.B. Fenton, and C.G. Guglielmo. 2009. Effect of age on energy storage during prehibernation swarming in little brown bats (Myotis lucifugus). Canadian Journal of Zoology, 87: 515-519.

N/A

Stihler, C. West Virginia Division of Natural Resources, pers observ. October 1996. Reference excerpted from USFWS Indiana Bat Revised Recovery Plan, March 1999.

During September in West Virginia, male Indiana bats roosted within 5.6km [of hibernacula] in trees near ridgetops, and often switched roost trees from day to day.

Last researched by: Hall

Date researched: 7/24/2015

Mammalia

Meadow Jumping Mouse
Zapus hudsonius

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7693	Not applicable	Capture Location	30 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7694	Not applicable	Live Individual Sighting	30 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7695	Not applicable	On Road	30 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7696	Not applicable	Physical evidence	30 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Typical home ranges sizes are about 0.3 hectares according to NatureServe. For instance, Nowak 1991, calculated home ranges of Z. hudsonius to be about 0.15 to 1.0 hectares and Meyers 1969 and Stinson 1977, reported home ranges averaging 0.17 to 0.3 hectares in male Z. princeps.

Literature:

•Meyers, L. G. 1969. Home range and longevity in ZAPUS PRINCEPS in Colorado. American Midland Naturalist 82:628-629.

•Nowak, R. M. 1991. Walker's mammals of the world. Fifth edition. Vols. I and II. Johns Hopkins Univ. Press, Baltimore. 1629 pp.

NatureServe. 2018. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org. (Accessed: December 19, 2018).

Stinson, N., Jr. 1977. Home range of the western jumping mouse, ZAPUS PRINCEPS, in the Colorado Rocky Mountains. Great Basin Naturalist 37:87-90.

Last researched by: Fowles

Date researched: 12/19/2018

Mammalia

North Atlantic Right Whale
Eubalaena glacialis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7742	Nonbreeding	Live Individual Sighting	25 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7743	Nonbreeding	Foraging Area	25 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
7745	Nonbreeding	Stranding	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

The baleen whales which occur off the NJ coast are, for the most part, migrating between summer feeding grounds in the north and winter breeding and/or calving grounds in the south. Foraging has been documented for humpback whales off the NJ coast and may also be engaged in by fin whales, but the bulk of foraging behavior occurs farther north and perhaps offshore (foraging in NJ waters may be opportunistic). Northern Right Whales, whose preferred diet consists of calanoid copepods, are not thought to feed in NJ waters. Movements are patterned and consistent, but movements of individuals in a given year may vary according to their energetic and reproductive condition, climatic factors, etc. Thus, due to the migratory behavior of these species in NJ waters, as well as the tremendous distance which they are capable of traveling within relatively short spans of time (Mate 1999; NMFS 1991; Watkins 1996), formulating a Species Occurrence Area (SOA) based upon a home range is both impractical and inappropriate for an area which primarily functions as a migratory corridor. However, in order to provide a basis by which these species may best be represented within the current SOA framework, the documented average daily distance traveled will be used to determine the SOA radius. Due to the paucity of data regarding migratory movements of baleen whales between summering and wintering grounds in the northwest Atlantic, an extremely conservative SOA radius of 25 km was chosen.

Literature:

Mate, Bruce R., and B.A. Lagerquist. 1999. Movements of North Pacific blue whales during the feeding season off southern California and their southern fall migration. Marine Mammal Science 15(4): 1246-1257.

The satellite-acquired locations of 10 blue whales tagged with Argos radio tags indicated an overall average speed of individual whales ranging from 58 to 172km/day. Migratory individuals covered greater average distance as opposed to clustered or foraging movements.

Merrick, Richard L., P.J. Clapham, T. Cole, P. Gerrior, and R.M. Pace III. 2001. Identification of Seasonal Area Management Zones for North Atlantic Right Whale Conservation. Northeast Fisheries Science Center Reference Document 01-14.

Within the northern right whale’s summer foraging habitat, the size of an area necessary to contain a right whale’s movement over a 1-2 week period was calculated to be a 15 nautical mile (27.78) radius.

National Marine Fisheries Service. 1991. Recovery Plan for the Humpback Whale (Megaptera novaeangliae). Prepared by the Humpback Whale Recovery Team for the National Marine Fisheries Service, Silver Spring, Maryland. 105 pp.

Estimated migration speeds of humpback whales migrating between summering and wintering areas were: 78 days (2.38 km/hr) for a 4,500 km distance between Hawaii and Alaska; and 3.29 km/hr and 2.28 km/hr for two individuals migrating between the Greater Antilles and Massachusetts Bay.

Watkins, William A., J. Sigurjonsson, D. Wartzok, R.R. Maiefski, P.W. Howey, and M.A. Daher. 1996. Fin whale tracked by satellite off Iceland. Marine Mammal Science 12(4): 564-569.

The average daily distance of a fin whale tagged with a satellite transmitter was 36 km (range 1.9 km - 156.6 km, median 23 km) over a period of 45 days.

Last researched by: Davenport

Date researched: 1/1/2007

Mammalia

Northern Hoary Bat

Lasiurus cinereus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7647	Undetermined	Active Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7648	Maternity colony	Maternity Colony	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7650	Nonbreeding	Inactive Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8500	Hibernaculum	Hibernaculum	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8505	Roost	Roost Site	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes

Justification:

Hoary bats are a tree-roosting species, most often roosting individually in foliage but sometimes finding shelter in cavities (Shump & Shump 1982). They may switch roosts every day or so (Veilleux et al. 2009). Adult females have been found to forage up to 20 km away from their day roosts (Barclay 1989), but most often the foraging radius is little more than 1 km from the roost (Fenton 1997; Sparks et al. 2005; Veilleux et al. 2009). We therefore apply a 2 km buffer size to maternity colonies, roosts, and active season sightings. Hoary bats forage within the forest and over water bodies (Veilleux et al. 2009), and will take advantage of street lights where insects are concentrated (Fenton 1997).

Primarily, hoary bats migrate south in the fall, with many overwintering south of the United States (Shump & Shump 1982). Some, however, can be found scattered across the U.S. in winter. From June to September it is believed that males inhabit the western mountainous regions of North America, and females inhabit the northeast (Cryan 2003), though occurrence records are sparse. In the absence of more detailed literature on the migration and hibernation habits of hoary bats, we apply the same 2.0 km buffer to hibernaculum/inactive season sightings as is used for roost sites and active season sightings at this time.

Literature:

Barclay, R.M.R. 1989. The effect of reproductive condition on the foraging behavior of female hoary bats, Lasiurus cinereus. Behavioral Ecology and Sociobiology. 24: 31-37

Lactating hoary bats started foraging earlier in the night and spent more time foraging. As lactating progressed, bats spent more and more time foraging per night and less time at the roost. Females traveled up to 20 km away from day roosts.

Cryan, Paul M. 2003. Seasonal distribution of migratory tree bats (Lasiurus and

Lasionycteris) in North America. Journal of Mammalogy. 84: 579-593.

Hoary bats are found scattered through North America during the winter from the Eastern US to California, south to Mexico. From June to September, there is a lack of reports of hoary bats east of the Mississippi River and south of the Ohio River. During this time, males occupy the western mountainous regions of North America, and females occupy the north east.

Fenton, M. B. 1997. Science and the conservation of bats. Journal of Mammalogy. 78:1-14.

In Ontario, the effects of street lights on hoary bat foraging were studied as the lights attract high concentrations of insects. Bats roosted within 1 km of the light they used for foraging most often.

Shump Jr., Karl A. and A.U. Shump. 1982. Lasiurus cinereus. Mammalian Species. 185:1-5/

Hoary bats most often roost in the foliage of trees but have also been found to roost in cavities. While many migrate and winter south of the United States, some stay and winter in northern areas.

Sparks, Dale W., C.M. Ritzi, and B.L. Everson. 2005. Nocturnal behavior an roosting ecology of a juvenile Lasiurus cinereus near Indianapolis, Indiana. Proceedings of the Indiana Academy of Science. 114:70-72.

A juvenile hoary bat was tagged and monitored in Indiana to determine its home range and travel distance. It flew no further than 1.2 km from any of its roosts and foraged for an average of 107 minutes each night. Its home range was determined to be about 21.5 ha.

Veilleux, Jacques P., P.R. Mooseman Jr., D.S. Reynolds, K.E. LaGory, and L. J. Walston, Jr. 2009. Observations of summer roosting and foraging behavior of a hoary bat (Lasiurus cinereus) in southern New Hampshire. Northeastern Naturalist. 16:148-152.

A juvenile hoary bat in New Hampshire was tagged and monitored. During a period of ten days, it used six different roost trees. There was an average distance of 42 m between consecutive roosts. The roost site was 0.8 km from a capture site and 0.4 km from a pond where the bat did 15% of its foraging. 70% of its foraging occurred within the forest.

Last researched by: Hall

Date researched: 7/18/2015

Mammalia

Northern Myotis
Myotis septentrionalis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7597	Maternity colony	Maternity Colony	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7598	Hibernaculum	Hibernaculum	4.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7601	Nonbreeding	Inactive Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7602	Undetermined	Active Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8508	Roost	Roost Site	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes

Justification:

Northern long-eared bats use a wide variety of forested habitats in summer, including woodlands of variable tree densities and canopy closures as well as forest edges, riparian zones, and interspersed areas of wetlands, fields, and linear wooded corridors. They roost in live or dead trees >3 inches dbh that have sloughing bark, cracks, crevices, or cavities. Northern long-eared bats have also been found roosting in buildings, barns, bridges, and bat houses. The species' summer home range is typically within a 3 mile (4.8 km) radius of a capture location or positive acoustic identification, or within 1.5 miles (2.4 km) of a roost (USFWS 2014). For radio-tracked northern long-eared bats (n>300), the distance between foraging areas and roost trees ranged from 0.07 km (0.04 mi) to 4.8 km (3.0 mi), with a mean distance of around 1.7 km (1.1 mi). Roost switching typically occurs every two days or so (Carter and Feldhamer 2005; Foster and Kurta 1999; Sasse and Pekins 1996; Timpone et al. 2010).

Migratory distances of 5-168 miles have been documented among northern long-eared bats, and 40-50 miles is typical (USFWS 2014). Spring staging and fall swarming areas consist of wooded habitats within 5 miles (8 km) of a hibernaculum (USFWS 2014). Due to a paucity of published information on spring staging/fall swarming and foraging ranges surrounding hibernacula, we refer to the information available on the closely related Indiana bat (Myotis sodalis), which shares a similar life history with the northern long-eared bat, and therefore apply the same 4.0 km hibernaculum buffer at this time.

Literature:

Carter, T. C. and G. A. Feldhamer. 2005. Roost tree use by maternity colonies of Indiana bats and northern long-eared bats in southern Illinois. Forest Ecology and Management. 219: 259-268.

N/A

Foster, R.W., and A. Kurta. 1999. Roosting ecology of the northern bat (Myotis septentrionalis) and comparisons with the endangered Indiana bat (Myotis sodalis). Journal of Mammalogy 80: 659-672.

N/A

Jackson, J. L. 2004. Effects of Wildlife Stand Improvements and Prescribed Burning on Bat and Insect Communities: Buffalo Ranger District, Ozark-St. Francis National Forest, Arkansas. M.S. Thesis. Arkansas State University. 162 pp.

Thirty northern long-eared bats were tracked to 259 roosts; the maximum distance traveled within a summer home range was 1.7 miles.

Kiser, J.D. and C.L. Elliott. 1996. Foraging habitat, food habits, and roost tree characteristics of the Indiana bat (Myotis sodalis) during autumn in Johnson County, Kentucky. Final report, Kentucky Dept. of Fish and Wildl. Resources, Frankfort, Kentucky. 65 pp.

In Kentucky, Kiser and Elliott found male Indiana bats roosting primarily in dead trees on upper slopes and ridgetops within 2.4 km of their hibernaculum. In the fall, male Indiana bats tend to roost and forage in upland and ridgetop forests, but may also forage in valley and riparian forest; movements of 2.5-6.8 km have been reported in Kentucky and Missouri.

Sasse, D.B., and P.J. Pekins. 1996. Summer roosting ecology of northern long-eared bats (Myotis septentrionalis) in the White Mountain National Forest. Pp. 91-101 in Proceedings of the bats and forests symposium (R.M.R. Barclay and R.M. Brigham, eds.). British Columbia Ministry of Forests, Victoria, British Columbia, Canada.

In New Hampshire, the mean distance between foraging areas and roost trees was 602 m (0.37 miles) (p. 95). Canopy closure at roost trees was greater than 75 percent.

Stihler, C. West Virginia Division of Natural Resources, pers observ. October 1996. Reference excerpted from USFWS Indiana Bat Revised Recovery Plan, March 1999.

During September in West Virginia, male Indiana bats roosted within 5.6km [of hibernacula] in trees near ridgetops, and often switched roost trees from day to day.

Timpone, J.C., J.G. Boyles, K.L. Murray, D.P. Aubrey, and L.W. Robbins. 2010. Overlap in roosting habits of Indiana bats (Myotis sodalis) and Northern bats (Myotis septentrionalis). American Midland Naturalist. 163: 115-123.

In Missouri, 13 northern long-eared bats were tracked to 39 roosts, which were an average 1.7 km (1.1 mi) from the point of capture (range 0.07-4.8 km (0.04-3.0 mi). The mean distance traveled between roost trees was 0.67 km (0.42 mi) (range 0.05-3.9 km [0.03-2.4 mi]). Canopy coverage at roosts averaged 56 percent.

US Fish and Wildlife Service. 2014. Northern long-eared bat interim conference and planning guidance, USFWS Regions 2, 3, 4, 5, & 6. 67 pp.

N/A

Last researched by: Hall

Date researched: 6/12/2015

Mammalia

Silver-haired Bat
Lasionycteris noctivagans

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7611	Nonbreeding	Inactive Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7613	Undetermined	Active Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7614	Maternity colony	Maternity Colony	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8501	Hibernaculum	Hibernaculum	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8503	Roost	Roost Site	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes

Justification:

Silver-haired bats roost primarily beneath the loose bark of dead or dying trees or in other tree crevices/cavities, and they are known to switch roosts regularly throughout the summer. Campbell et al. (1996) found that radio-tracked bats roosted within 3.4 km of their capture locations, but typically closer. We therefore apply a 2 km buffer size to maternity colonies, roosts, and active season sightings.

Most silver-haired bats summer between southern Canada and the northern and western United States, then migrate southward in autumn to southern and eastern parts of the U.S. for winter (Cryan 2003). They hibernate in hollow trees, cliff crevices, and underground caves and mines (Fergus 2003). Scarcely, silver-haired bats have been documented to hibernate in (coastal) NJ (Fergus 2003) and even as far north as New York; occasionally they are found in buildings. Details about hibernation habits and densities of silver-haired bats in NJ are scarce, but given that the species is primarily migratory and appears adaptable in behavior, we apply the same 2.0 km buffer to hibernaculum/inactive season sightings as is used for roost sites and active season sightings at this time.

Literature:

Betts, Burr J. 1998. Roosts Used by Maternity Colonies of Silver-Haired Bats in Northeastern Oregon. Journal of Mammalogy. 79:643-650.

Selected roost trees were three times further away from tall neighboring trees than other available possible roost trees. This is most likely due to the fact that they receive less shade and provide a warmer roost. Cavity trees that rose above the canopy were more likely to be selected than shorter trees.

Campbell, Lori A., J.G. Hallett, M.A. O’Connell. 1996. Conservation of Bats in Managed

Forests: Use of Roosts by Lasionycteris noctivagans. Journal of Mammalogy. 77:976-984.

Among 15 radio-tracked silver-haired bats in the Pacific Northwest, all (15) documented roost sites were >100 m from the riparian zone thought to be a foraging area. The research suggested that there is a trade-off between the roost benefits of warmer upland areas and the abundant food resources of the cooler riparian area. The maximum distance between a roost and a capture area was 3.4 km, but most were captured much closer.

Cryan, P.M. 2003. Seasonal distribution of migratory tree bats (Lasiurus and Lasionycteris) in North America. Journal of Mammalogy 84:579-593.

N/A

Fergus, Charles. Wildlife of Virginia and Maryland and Washington, DC. 2003. Stackpole Books. 28-29.

Silver-haired bats winter from Illinois to coastal New Jersey south to Georgia, Mississippi, and Alabama. They hibernate in hollow trees, cliff crevices, caves, and mines.

Geluso, Keith, J.J. Huebschman, J.A. White, and M.A. Bogan. 2004. Reproduction and seasonal activity of silver-haired bats (Lasionycteris noctivagans) in western Nebraska. Western North American Naturalist. 64:353-358.

A bat in Nebraska was recorded during the migratory period with enough fat reserves to last through the winter. It is possible that it was preparing to hibernate instead of migrate.

Mattson, Todd A., S.W. Buskirk, and N.L. Stanton. 1996. Roost sites of the silver-haired bat (Lasionycteris noctivagans) in the Black Hills, South Dakota. Great Basin Naturalist. 247-253.

Silver-haired bats were found roosting under loose bark of snags and in tree cavities and crevices. Roosts were in snags averaging 39 cm DBH. They switched roost trees regularly. The bats roosted in areas of relatively high snag densities (approx. 21 snags/hectare).

Vonhof, Martaan J. and B.J. Betts. 2010. Nocturnal Activity Patterns of Lactating Silver-Haired Bats (Lasionycteris noctivagans): the Influence of Roost-Switching Behavior. Acta Chiropterologica. 12:283-291.

Silver-haired bats switch summer roosts sites, usually to another tree within about 200 m. On nights of roost shifts, it is thought that bats travelled less distance from the roost to a foraging ground as they were absent from both roosts in frequent but short intervals.

Last researched by: Hall

Date researched: 7/17/2015

Mammalia

Tricolored Bat
Perimyotis subflavus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7618	Maternity colony	Maternity Colony	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7620	Undetermined	Active Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7621	Nonbreeding	Inactive Season Sighting	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
7622	Hibernaculum	Hibernaculum	4.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes
8510	Roost	Roost Site	2.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Convert to a point and buffer	Yes

Justification:

Tricolored bats roost in clusters of dead leaves (or needles) in the canopies of living or dead trees (Perry and Thill 2007) and have been found to switch roost trees every 4 days, on average (Veilleux 2003). Tricolored bats travel up to 4.3 km between summer roost sites and their foraging grounds (Veilleux 2003), though the distance can be much shorter. Male bats in North Carolina were found to roost an average of 186 meters from the forest edge habitats where they foraged (O'Keefe et al. 2009). We use roughly the average distance, 2 km, as the buffer size for maternity colonies, roosts, and active season sightings.

Tricolored bats have been documented traveling up to 85 miles in Autumn to the caves and abandoned mines where they typically hibernate (Massachusetts Division of Fish and Wildlife 2015). Due to a paucity of published information on spring staging/fall swarming behavior of the tricolored bat and its foraging range surrounding hibernacula, we refer to the information available on the Indiana bat (Myotis sodalis), which shares a similar life history, and therefore apply the same 4 km hibernaculum buffer and 2 km inactive season buffer at this time.

Literature:

Damm, Jason P. and K. Geluso. 2008. Use of a mine by eastern pipistrelles (Perimyotis subflavus) in East Central Nebraska. Western North American Naturalist. 68:382-389.

Tricolored bats hibernating in a mine in were observed as torpid from November to April. In May, September, and October some bats were active while some were torpid. Most bats exited the mine in May. The bats moved very little during the hibernation period.

Kiser, J.D. and C.L. Elliott. 1996. Foraging habitat, food habits, and roost tree characteristics of the Indiana bat (Myotis sodalis) during autumn in Johnson County, Kentucky. Final

report, Kentucky Dept. of Fish and Wildl. Resources, Frankfort, Kentucky. 65 pp.

In Kentucky, Kiser and Elliott found male Indiana bats roosting primarily in dead trees on upper slopes and ridgetops within 2.4 km of their hibernaculum. In the fall, male Indiana bats tend to roost and forage in upland and ridgetop forests, but may also forage in valley and riparian forest; movements of 2.5-6.8 km have been reported in Kentucky and Missouri.

Massachusetts Division of Fisheries and Wildlife. 2015. Tricolored bat (Perimyotis subflavus). Natural Heritage and Endangered Species Program. Www.mass.gov/nhesp.

Tricolored bats roost in the dead leaves of mature living or dead deciduous trees. Maternity colonies are often found in the dead needles of living pine trees. They can travel up to 5 miles from their roost to a foraging site. Late in the summer, the bats swarm outside of possible hibernacula site, usually limestone caves and abandoned mines. They have been known to migrate up to 85 miles to hibernation sites.

O'Keefe, Joy M., S.C. Loeb, J.D. Lanham, and H.S. Hill Jr. 2009. Macrohabitat factors affect day roost selection by eastern red bats and eastern pipistrelles in the southern Appalachian Mountains, USA. Forest Ecology and Management. 257:1757-1763.

Tricolored bats forage in early succession and edge environments. In a study in North Carolina, male bats were found roosting an average of 186 m away from forest edge habitat.

Perry, R.W. and R.E. Thill. 2007. Tree roosting by male and female Eastern Pipistrelles in a forested landscape. Journal of Mammology 88(4): 974-981.

Used radio-telemetry to locate and characterize summer roosts of 21 male and 7 female eastern pipistrelles (tricolored bats) in the Ouachita Mountains of Arkansas. All 47 roosts were located in the vegetation of tree canopies; 50% of the females' roosts and 91% of the males' roosts were in dead leaves of deciduous trees. Three of 7 maternity colonies were in dead needles of large live pines.

Stihler, C. West Virginia Division of Natural Resources, pers observ. October 1996. Reference excerpted from USFWS Indiana Bat Revised Recovery Plan, March 1999.

During September in West Virginia, male Indiana bats roosted within 5.6km [of hibernacula] in trees near ridgetops, and often switched roost trees from day to day.

Veilleux, Jacques P., J.O Whitaker Jr., and S.L Veilleux. 2003. Tree-roosting ecology of reproductive female eastern pipistrelles, Pipistrellus subflavus, in Indiana. Journal of Mammalogy. 84:1068-1075.

A study of reproductive bats in Indiana found that the maximum distance travelled from roost site to foraging grounds was 4.3 km. They roosted in umbrella shaped clusters of dead leaves, and the bats stayed at each roost tree for an average of 3.9 days before switching to a new site.

Last researched by: Hall

Date researched: 7/20/2015

Petromyzontida

American Brook Lamprey

Lethenteron appendix

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8915	Not applicable	Occupied Habitat	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8564	Not applicable	Capture Location - Adult	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8565	Not applicable	Capture Location - Egg	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8566	Not applicable	Capture Location - Larvae	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8567	Not applicable	Capture Location -YOY	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

Justification:

The American Brook Lamprey geographic distribution is patchy but has the widest of any nonparasitic lamprey in North America (Page and Burr 1991), reaching as far south as Alabama, west to Arkansas, north to the upper peninsula of Michigan and southern Canada, and east to the Atlantic coast. Habitat preference between larvae (ammocoetes) and adults is quite different. During the ammoecete 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). However, in Michigan it was documented that ammoecoetes have been found 450 m from their originating streams demonstrating movement from natal streams (Renaud 2011). Metamorphosis occurs in late summer and adults move to gravel-sand riffles and runs where they spawn the following spring (Hoff 1988). Hammerson (2004) states that separation distance is arbitrary for American Brook Lamprey because it’s difficult to define suitable and unsuitable habitat. Considering dispersal has not been well documented, aside from movement related to spawning, a 1 km radius buffer was chosen. Our recommendations do not consider distances necessary to protect populations from water quality threats such as heavy metals, pesticides, sewage treatment plant effluents, and other point and nonpoint contaminant sources.

Literature:

Hammerson, G. 2004. NatureServe Web Site. Population/occurrence delineation for nonanadromous Lampreys.

Hardisty, M.W. and I.C. Potter (Eds.). 1971. The Biology of Lampreys, Vols. 1-4. Academic Press, New York, NY. 1938 pp

Hoff, J. G. 1988. Some aspects of the ecology of the American brook lamprey, LAMPETRA

APPENDIX, in the Mashpee River, Cape Cod, Massachusetts. Canadian Field-Nat. 102:735-737.

Page, L. M., and B. M. Burr. 1991. A field guide to freshwater fishes: North America north of Mexico. Houghton Mifflin Company, Boston, Massachusetts. 432 pp.

Renaud, C.B. 2011. Lampreys of the wordl. An annotated and illustrated catalogue of lamprey species known to date. Food and Agriculture Organization of the United Nations. Rome.

Last researched by: Collenburg

Date researched: 9/12/2023

Reptilia

Bog Turtle
Glyptemys muhlenbergii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4762	Not applicable	Hibernaculum	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4763	Not applicable	Occupied Habitat	Bog Turtle Model + Hand Digitized Polygon	Apply a buffer	Convert to a point and buffer	Apply a buffer	Yes
4764	Not applicable	On Road	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4765	Not applicable	Suitable Habitat	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

Glyptemys muhlenbergii is a habitat specialist that occupies wetlands that meet certain characteristics of vegetation, soils, and, most importantly, hydrology. The life history of G. muhlenbergii is somewhat unique in that it spends the majority of the year within the wetland complex and often does not venture for great periods of time into the adjacent uplands and therefore the identification of wetlands occupied by the bog turtle is critical to the recovery of this species. A percentage of wetlands with bog turtles are of a small enough size that they are not currently identified as Wetlands in the 2007 Land Use/Land Cover data layer so therefore polygons are hand digitized to reduce the chance of not capturing core habitat.

An additional 200 meters is generated around the Bog Turtle Colony polygons to account for turtle movements not identified during fieldwork as well as habitat that is valuable to the colony, but was not identified by the biologists. This new polygon is the Species Occurrence Area (SOA).

Literature:

Chase et al. 1989. Habitat Characteristics, Population Size, and Home Range of the Bog Turtle, Clemmys muhlenbergii, in Maryland. Journal of Herpetology 23(4): 356-362.

Discusses bog turtle habitat use as mostly isolated to specific wetland types.

Morrow et al. 2001. Home Range and Movements of the Bog Turtle in Maryland. Journal of Herpetology 35(1): 68-73.

Discusses use of wetlands as primary habitat for bog turtles throughout duration of study.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

Inferred minimum extent of habitat use for this species is 200 meters.

Last researched by:	Zarate
Date researched:	1/1/2006

Reptilia

Eastern Copperhead
Agkistrodon contortrix

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5112	Not applicable	On Road	236 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5113	Not applicable	Gestation Site	132 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5114	Not applicable	Telemetry: Home Range	236 Meter Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
5115	Not applicable	Occurrence by Den	1000 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5117	Not applicable	Occupied Habitat	236 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5118	Not applicable	Hibernaculum	1000 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5119	Not applicable	Telemetry: Partial Activity Range	236 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
8585	Not applicable	Nesting Area	10 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through the NJ Endangered and Nongame Species Program (ENSP) research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. However, such literature documenting the activity range size of northern copperheads (Agkistrodon contortrix mokasen) is scant.

Similarities between the northern copperhead and the timber rattlesnake behavior including males traveling greater distances than females (Smith 2007, Smith et al. 2009, Sutton et al. 2017), fidelity to and importance of gestation and birthing areas, basking sites and hibernacula, and the need for larger males (and possibly nongravid females) to disperse further in search of mates, foraging opportunities and basking sites warrant a similar approach to identifying habitat used by the northern copperheads as with our montane timber rattlesnakes; i.e., identify a suitable buffer for winter hibernacula that would more accurately represent the habitat used by each hibernaculum/den population. However, unlike the timber rattlesnake, there is currently not enough information and therefore, no published literature identifying such a recommended buffer.

One article by Fitch, 1960, documents the home range of Agkistrodon contortrix as 9.9 ha, but the difference in habitat types between the study location and New Jersey is unclear. Additionally, the research predates the use of radio-telemetry in snake research and therefore, it is likely the data does not accurately represent this species' entire activity ranges. More recently, Smith et al. (2009) reported the activity range of male copperheads in Connecticut ranging from 6.09 to 44.49-ha with a mean of 17.49 + 2.68-ha. These ranges may include sub-adult males with smaller dispersal distances and as with most analyses, has excluded "outlier locations," as having the potential to "artificially inflate activity range size" (Smith et al. 2009). However, given only a subset of animals are tracked, it may be premature to assume that "outliers" for the subset are negligible and/or unimportant in the snakes' life history. Smith et al. (2009) also reported males had a mean maximum distance from their hibernacula of 769.5 + 73.6-m. Philip Dunning (2009, unpub. data) found adult males in Pennsylvania 965.5 to 1,223 meters from the hibernacula (an average of 1,105.07-m), although these were not necessarily the furthest distances moved as these snakes were not tracked through an entire active season.

Smith also found that his study site of approximately 1000-ac (~ 404-ha), containing two documented hibernacula, was used almost in its entirety by the local copperhead populations (Charles F. Smith, pers. comm., 2009) regardless of the reported activity ranges for individuals. Such a finding parallels [montane] timber rattlesnakes' habitat use surrounding a hibernaculum (i.e., the snakes disperse in different directions and patterns) and therefore, supports the need of a hibernaculum buffer that adequately identifies the habitat used by a hibernaculum/den population. As such, for the purpose of creating a reasonable buffer that would more accurately approximate the habitat needs of a documented hibernaculum population, consideration of Smith's study area of 1000-acres (404.69-ha), Smith et al. (2009) reported mean maximum distance males moved from their hibernacula, and Dunning's (2009, unpub. data) observed distances from the hibernacula, a 1,000-m (1.0-km) buffer will be applied to all documented "Hibernaculum," and "Occurrence by Den" observations equating to an area of 314.16-ha.

Smith et al. (2009) reported the activity range of females ranged from 0.6- to 15.67-ha with a mean activity range of 5.02-ha based on annual activity ranges of individuals; i.e., activity ranges of females tracked in consecutive years were treated as replicates rather than combined to identify each females overall activity range within the landscape and therefore, may underrepresent the females' activity ranges as demonstrated by northern pine snake research (Zappalorti et al. 2014). Since annual shifting occurs in northern copperheads as with other species of snakes (e.g., northern pine snake, timber rattlesnake), a more appropriate representation of their activity ranges may be represented by combining all of the relocation data over the tracking period (i.e., multiple years) for each snake to determine the overall range. However, raw data is not available for this assessment. As such, in an effort to more accurately reflect the area used by females, a recalculation of the data based solely on the larger annual home range for each female resulted in a mean activity range of 5.5-ha. This area was converted into an estimate of square meters and assumed to be circular in configuration. The buffer distance (radius of the circular activity range) was then calculated resulting in a radius of 132.31-m (rounded to 132-m) to be applied to observations of gravid females at gestation and birthing sites (i.e., "Gestation Site" feature label).

Northern copperheads are ovoviviparous and therefore, the feature label "nesting area" does not apply to this species.
"Occupied Habitat" and "On Road" refers to random sightings whereby it is [typically] impossible to confirm the snake's origin (i.e., hibernaculum/den location). However, copperheads den on New Jersey's mountain slopes. As such, for some random observations, the ENSP has a general understanding of where the snakes originated or at least, from which direction they originated. For these sightings, minimum convex polygon home range data (Row and Blouin-Demers 2006) for male northern copperheads (Smith et al. 2009) was reviewed for the remaining feature label buffers. Due to the limited available data, focus for this assessment remained on male snakes (with larger activity ranges than females) in an effort to more accurately identify habitat use by the local population. Smith et al. (2009) reported a mean activity range of 17.49 + 2.68-ha. This calculation excluded "outlier" relocation sites for individual snakes and included data for most snakes tracked over multiple years; each year being treated as an independent replicate as used in the analysis by Reinert and Zappalorti (1988) and as such, likely underrepresents the snakes' activity ranges (Zappalorti et al. 2014). The mean activity range estimate of 17.49-ha was converted into an estimate of square meters and

assumed to be circular in configuration. The buffer distance (radius of the circular activity range) was then calculated resulting in a radius of 235.949-m (rounded to 236-m) to be applied to such random observations. Since activity ranges for this species are irregular in shape and somewhat oblong (Smith 2007, Smith et al. 2009, Sutton et al. 2017) rather than circular, it is likely these buffers underestimate the habitat used by this species.

"Telemetry: Home Range" and "Telemetry: Partial Activity Range" refers to observation locations collected through radio-telemetry studies; "home range" referring to snakes whereby a full season of data was collected, "partial activity range" referring to snakes whereby only part of the snake's active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Literature:

Dunning, P. 2006 and 2009 (unpublished data).

-Maximum single migratory distance from den*:
-Pennsylvania male, 1,226 m (1.23 km);
-Pennsylvania nongravid female**, 869 m (3.7 km)

-Recorded single migratory distance from den*:
-Adult male, 1,223.1 m (1.221 km);
-Adult male, 1,226.5 m (1.227 km);
-Adult male, 965.6 m (0.966 km);
-Sub-adult male***, 1,158.7 m (1.159 km)

* Note: These snakes were not followed through a complete active season and therefore, their migratory distances from the den(s) may not represent the snakes' furthest distance traveled.
** Only one nongravid female's distance was reported.
*** Suspected sub-adult male due to size, but range is indicative of a mature male.

Fitch H. S. 1960. Autecology of the copperhead. Univ. of Kansas Publications Museum of Natural History. 13:85-288 In: Roth, Eric. 2005 Spatial Ecology of a Cottonmouth (Agkistrodon piscivorus) Population in East Texas. Journal of Herpetology. June 2005, 39 (2): 308-312.

-Documented the home range of Agkistrodon contortrix at 9.9 ha (.099 square km).

Reinert, H.K. and R.T. Zappalorti. 1988. Timber rattlesnakes (Crotalus horridus) of the Pine Barrens: Their movement patterns and habitat preference. Copeia 1988(4):964-978.

-Describes the use of activity ranges for snakes monitored over two years as independent replicates for the purpose of statistical comparison "although not statistically rigorous."

Row, J.R. and G. Blouin-Demers. 2006. Kernels are not accurate estimators of home-range

size for herpetofauna. Copeia 20016(4):797-802.

-Describes the potential problems using kernel home-range estimators versus minimum convex polygon when working with reptiles and amphibians.

Smith, C.F. 2007. Sexual dimorphism, and the spatial and reproductive ecology of the copperhead snake, Agkistrodon contortrix. Ph.D.; University of Connecticut. Pp. 201; AAT3265803

-Home ranges were not circular.
-The following are the MCP home ranges (ha) per Smith (2007) of three telemetered snakes during their 2002 and 2003 active seasons including all relocation data.

Snake ID	Sex	Year	MCP (ha)
263	Male	2003	60.69*
825	Male	2003	9.29*
E64	Female	2002	4.61*

*Smith et al. (2009) excluded outlier relocation data during activity range calculations resulting in smaller activity ranges for these snakes during the years presented above.

Smith, C.F., G.W. Schuett, R.L. Earley, and K. Schwenk, 2009. The spatial and reproductive ecology of the copperhead (Agkistrodon contortrix) at the northeastern extreme of its range. Herpetological Monographs 23(1):45-73.

-Mean size home ranges:
  -Connecticut males, 17.49 plus or minus 2.68 ha;
  -Connecticut nongravid females, 5.02 plus or minus 1.15 ha
-Mean maximum migratory distance from den:
  -Connecticut males, 769.5 plus or minus 73.6 m;
  -Connecticut nongravid females, 363.1 plus or minus 63.8 m

-The following are the MCP home ranges (ha) per Smith et al. (2009) of telemetered snakes during their 2002 and 2003 active seasons, excluding outlier relocations:

Snake ID	Sex	Year	MCP (ha)
263	Male	2002	37.69
263	Male	2003	40.69
96C	Male	2002	13.36
96C	Male	2003	9.86
KLC	Male	2002	8.67
KLC	Male	2003	8.19
06A	Male	2002	35.81
06A	Male	2003	44.49
104	Male	2002	14.43
104	Male	2003	12.54
71C	Male	2002	17.41
71C	Male	2003	11.16
825	Male	2002	21.09
825	Male	2003	12.06
D54	Male	2002	9.29
D54	Male	2003	13.41

E36	Male	2002	11.76
E36	Male	2003	14.77
15A	Male	2002	6.09
15A	Male	2003	6.99
E64	Female	2002	3.45
E64	Female	2003	4.61
62B	Female	2002	13.99
62B	Female	2003	15.67
700	Female	2002	2.43
700	Female	2003	1.95
770	Female	2002	1.44
770	Female	2003	0.93
805	Female	2002	9.9
805	Female	2003	8.05
C29	Female	2002	0.6
C29	Female	2003	0.7
E02	Female	2002	3.9
E02	Female	2003	3.35
B1F	Female	2002	4.0
B1F	Female	2003	5.3

Sutton, W.B., Y. Wang, C.J. Schweitzer and C.J.W. McClure. (2017) Spatial ecology and multi-scale habitat selection of the Copperhead (Agkistrodon contortrix) in a managed forest landscape. Forest Ecology and Management 391, 469-481.

-Home ranges were not circular.
-Males have larger home ranges than gravid females; limited data on non-gravid females (1 snake) indicates non-gravid females also have larger home ranges than gravid females.
-Planned to track every five to seven days approximately April through November; not all snakes were tracked for entire season.
  -Tracked 22 snakes (16 males, 5 gravid females, 1 non-gravid female)
  -MCP males: 12.0 + 1.9-ha
  -MCP females: 4.1 + 1.1-ha (2 of the 6 females were not tracked for a complete season; i.e., egress through ingress)

Zappalorti, R.T., D. Burkett, M. McCort, D. Schneider, and K. Schantz. 2014. Final Northern Pine Snake Monitoring and Radio-tracking Report, Conducted at the Stafford Business Park, Stafford Township, Ocean County, New Jersey. March 14, 2014. 182 pp.

-Northern pine snakes' home range maps illustrate non-circular ranges and annual shifting in activity ranges.
-Activity range calculations were based on each snake's collective relocations over multiple years, demonstrating single year activity ranges underrepresent a snake's activity range over the course of their life.

Last researched by: Schantz

Date researched: 11/15/2021

Reptilia

Eastern Hog-nosed Snake
Heterodon platirhinos

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6927	Not applicable	Telemetry: Home Range	389 Meter Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
6928	Not applicable	Telemetry: Partial Activity Range	389 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
6929	Not applicable	Gestation Site	10 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6930	Not applicable	Hibernaculum	442 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6931	Not applicable	On Road	389 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6932	Not applicable	Occupied Habitat	389 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6933	Not applicable	Nesting Area	442 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6934	Not applicable	Occurrence by Den	442 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. However, such literature for eastern hognose snakes (Heterodon platirhinos) is scant. Furthermore, the eastern hognose snake inhabits all regions of New Jersey from the mountains to the coastal plains and as such, range movements will likely vary with the local topography when quantified through an aerial view versus actual range movements on-the-ground. Although the available literature provided insight into range movements within varied topography, it is difficult to apply different buffers representing varied activity ranges to hognose snake observations based on their locations as New Jersey's valleys (i.e., relatively flat areas) among the mountains complicate such efforts to accurately represent the home ranges of observed snakes across the New Jersey landscape. This assessment focused on radio-telemetry studies that appeared to be the most consistent in their tracking efforts and therefore, likely more accurately reflect the movements and ranges of their study groups.

Minimum convex polygon home range data (Row and Blouin-Demers 2006) for resident eastern hognose snakes from available literature that tracked snakes from egress through ingress was compiled and recalculated. Due to limited available data, this calculation included data for some snakes tracked over multiple years; each year being treated as an independent replicate as used in the analysis by Reinert and Zappalorti (1988) or the reported total mean range for each individual. Eighteen home ranges based on 10 males and 8 females from two studies (Plummer and Mills 2000, Buchanan et. al 2017) contributed to this assessment. The study site used for the Plummer and Mills (2000) consisted of rolling hills, varying in elevation (60 – 120-meters) and the Buchanan et. al (2017) study site was along the Cape Cod seashore (elevation 3 – 33-meters); both having relatively flat terrain.

"Occupied Habitat" and "Dead on Road" refers to random sightings whereby it is impossible to determine the snake's den location or activity range. All available data, regardless of the snakes' sexes, were assessed to create a reasonable buffer that could be applied to such locations and approximate habitat needs for this species. The mean activity range estimate (47.6-hectares) was converted into an estimate of square meters and assumed to be circular in configuration. The buffer distance (radius of the circular activity range) was then calculated resulting in a radius of 389-meters to be applied to such random observations. Goulet et. al (2015) reported an average home range of 72.7-hectares based on the ranges of three males and two females. Although reporting a larger activity range, the study does not appear to have tracked the snakes from egress through ingress, and while that would likely only increase the range, this data has been omitted from this review as it did not meet the parameter of tracking for at least one complete season (i.e., egress through ingress).

Critical habitat features (i.e., hibernacula and nesting areas) and sites identified as "Occurrence by Den…" which relate to observations during egress and ingress where snakes bask proximate to hibernacula are more defined areas than random observations. Based on the average of activity ranges presented by Plummer and Mills (2000) and Buchanan et. al (2017), ten males had a mean activity range of 36.34-hectares and eight females had a mean activity range of 61.49-hectares, while together, as previously stated, they averaged 47.6-hectares. Given the importance of hibernacula as a "starting point" for any local population and that nesting areas would be within the activity range of females from any documented hibernacula, the larger [all female] activity range of 61.49-hectares has been applied to these critical habitat features ("Hibernaculum," "Occurrence by Den," and "Nesting Area" feature labels). This activity range estimate was converted into an estimate of square meters and assumed to be circular in configuration. Buffer distance (radius of the circular activity range) was then calculated resulting in a radius of 442-meters. Eastern Hognose snakes are oviparous and therefore, the feature label "gestation site" does not apply to this species.

Since activity ranges for this species are irregular in shape and somewhat oblong (Plummer and Mills 2000, Finn 2005, Lagory et. al 2009) rather than circular, it is likely these buffers underestimate the habitat used by this species.

"Telemetry: Home Range" and "Telemetry: Partial Activity Range" refers to observation locations collected through radio-telemetry studies; "home range" referring to snakes whereby a full season of data was collected, "partial activity range" referring to snakes whereby only part of the snake's active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Literature:

Buchanan, S.W., B.C. Timm, R.P Cook, R. Couse, and L.C. Hazard. 2017. Spatial ecology and habitat selection of Eastern Hognose Snakes. The Journal of Wildlife Management. 81(3):509-520.

Snake ID	Sex	MCP home range (ha)

D	Female	209.3
G	Male	8.4
H	Female	22.4
I	Male	51.1
J	Female	21.8
K	Female	94.7
L	Female	19.0
M	Male	19.0
N	Female	6.2
O	Male	24.9
P	Male	2.8

Finn, W. 2005. Home range and spatial ecology of eastern hognose snakes (Heterodon platirhinos). Intern report. Office of Science, Science Undergraduate Laboratory Internship, University of Rhode Island, Brookhaven National Laboratory. Upton, New York. 11 pp.

-Eastern hognose snakes' home range maps illustrate non-circular ranges.

Goulet, C., J.A. Litvaitis, and M.N. Marchand. 2015. Habitat associations of the eastern hognose snake at the northern edge of its geographic distribution: Should a remnant population guide restoration? Northeastern Naturalist 22(3):530-540.

-Tracked "snakes at approximately 2-day intervals."
-Average MCP 72.7 + 35.25-hectares (three males, two females)

Lagory, K.E., L.J. Walston, C. Goulet, R.A. VanLonkhuyzen, S. Najjar, and C. Andrews. 2009. An examination of scale-dependent resource use by eastern hognose snakes in southcentral New Hampshire. Journal of Wildlife Management 73(8):1387-1393.

-Eastern hognose snakes' home range maps illustrate non-circular ranges.

Plummer, M.V. and N.E. Mills. 2000. Spatial ecology and survivorship of resident and translocated hognose snakes (Heterodon platirhinos). Journal of Herpetology 34(4):565-575.

-Study area within "easternmost part of Arkansas River Valley subdivision of the Ouachita Moutain region of Arkansas…bordered the Little Red River" in White County: Landscape is "rolling to hilly" with "upland deciduous woodland" and "upland deciduous forest."
-Elevation of study area ranged from 60-meters (196.8-feet) to 120-meters (393.7-feet)
-Eastern hognose snakes' home range maps illustrate non-circular ranges.
-Tracked snakes mostly "once each day."

Snake ID	Sex	MCP home range (ha)
1	F	58.6
1	F	59.9
6	M	72.8
6	M	26.6
7	F	50.5
8	M	46.2
11	M	65.5

Reinert, H.K. and R.T. Zappalorti. 1988. Timber rattlesnakes (Crotalus horridus) of the Pine Barrens: Their movement patterns and habitat preference. Copeia 1988(4):964-978.

-Describes the use of activity ranges for snakes monitored over two years for the purpose of statistical comparison "although not statistically rigorous."

Row, J.R. and G. Blouin-Demers. 2006. Kernels are not accurate estimators of home-range size for herpetofauna. Copeia 20016(4):797-802.

-Describes the potential problems using kernel home-range estimators versus minimum convex polygon when working with reptiles and amphibians.

Last researched by: Schantz

Date researched: 11/15/2021

Reptilia

Eastern Kingsnake
Lampropeltis getula

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5104	Not applicable	Telemetry: Partial Activity Range	500 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5105	Not applicable	Hibernaculum	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5106	Not applicable	Telemetry: Home Range	500 Meter Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
5107	Not applicable	On Road	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5108	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5109	Not applicable	Gestation Site	10 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5110	Not applicable	Occurrence by Den	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5111	Not applicable	Nesting Area	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through the NJ Endangered and Nongame Species Program (ENSP) research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. However, such literature for eastern kingsnakes (Lampropeltis getula) is lacking. NatureServe (2019) identifies the eastern kingsnakes as having a minimum inferred extent of 0.5-kilometers (500-meters); i.e., the distance to buffer an observation. Lacking additional details, a 500-meter buffer has been applied to all applicable feature labels. Since home ranges are not circular and instead are often somewhat oblong, it is likely these buffers underestimate the habitat used by this species.

Eastern kingsnakes are oviparous and therefore, the feature label “gestation site” does not apply to this species.
“Telemetry: Home Range” and “Telemetry: Partial Activity Range” refers to observation locations collected through radio-telemetry studies; “home range” referring to snakes whereby a full season of data was collected, “partial activity range” referring to snakes whereby only part of the snake’s active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a

complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Literature:

NatureServe. 2019. NatureServe Explorer: Population/Occurrence Delineation Report An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, VA. Available at: http://explorer.natureserve.org/servlet/NatureServe?sourceTemplate=tabular_report.wmt&loadTemplate=species_RptComprehensive.wmt&selectedReport=RptComprehensive.wmt&summaryView=tabular_report.wmt&elKey=894223&paging=home&save=true&startIndex=1&nextStartIndex=1&reset=false&offPageSelectedElKey=894223&offPageSelectedElType=species&offPageYesNo=true&post_processes=&radiobutton=radiobutton&selectedIndexes=894223&selectedIndexes=1027676 [Accessed June 05, 2019

N/A

Last researched by: Schantz

Date researched: 6/5/2019

Reptilia

Eastern Smooth Earthsnake
Virginia valeriae valeriae

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6754	Not applicable	Gestation Site	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6755	Not applicable	Occurrence by Den	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6756	Not applicable	Occupied Habitat	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6757	Not applicable	Nesting Area	10 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6758	Not applicable	On Road	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6759	Not applicable	Hibernaculum	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6760	Not applicable	Telemetry: Partial Activity Range	200 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
6761	Not applicable	Telemetry: Home Range	200 Meter Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through the NJ Endangered and Nongame Species Program (ENSP) research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. However, such literature for both the species, smooth earthsnake (Virginia valeriae) and subspecies, eastern smooth earthsnakes (Virginia valeriae valeriae) is lacking. NatureServe (2018) identifies the smooth earthsnake (Virginia valeriae) as having a minimum inferred extent of 0.2-kilometers (200-meters); i.e., the distance to buffer an observation. Lacking additional details, a 200-meter buffer has been applied to all applicable feature labels. Since home ranges are not circular and instead are often somewhat oblong, it is likely these buffers underestimate the habitat used by this species.

Eastern smooth earthsnakes are ovoviparous and therefore, the feature label “nesting area” does not apply to this species.
“Telemetry: Home Range” and “Telemetry: Partial Activity Range” refers to observation locations collected through radio-telemetry studies; “home range” referring to snakes whereby a full season of data was collected, “partial activity range” referring to snakes whereby only part of the snake’s active season was

recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Literature:

NatureServe. 2018. NatureServe Explorer: Population/Occurrence Delineation Report An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, VA. Available at: http://explorer.natureserve.org/servlet/NatureServe?searchName=Virginia+valeriae+valeriae [Accessed August 19, 2018.

Last researched by: Schantz

Date researched: 11/15/2021

Reptilia

Green Sea Turtle
Chelonia mydas

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7718	Undetermined	Marine Telemetry: Partial Activity Range	9.6 km Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
7719	Undetermined	Dead Individual Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
7721	Undetermined	Occupied Habitat	9.6 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8492	Undetermined	Nesting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No

Justification:

The Atlantic green, Atlantic loggerhead, and Atlantic ridley sea turtles both forage and migrate through NJ waters. While movement specific to migration is largely confined off-shore, foraging may occur both off-shore and within the neritic zone. The bulk of the scientific literature which pertains to determining a home range size, is based upon lower latitude habitats, relatively young individuals, and is predominantly focused on the Atlantic green turtle. Using the mean of the home range estimates from the studies detailed below and creating an average based upon those figures, produces a 9.6 km radius as the basis for a species occurrence area for these three species.

Literature:

Blumenthal, J.M., J.L. Soloman, C.D. Bell, T.J. Austin, G. Ebanks-Petrie, M.S. Coyne, A.C. Broderick, and B.J. Godley. 2006. Satellite tracking highlights the need for international cooperation in marine turtle management. Endangered Species Research. 7: 1-11.

Migrations of mature marine turtles typically span hundreds or thousands of kilometers.

Godley, B.J., E.H.S.M. Lima, S. Akesson, A.C. Broderick, F. Glen, M.H. Godfrey, P. Luschi, and G.C. Hays. 2003. Movement patterns of green turtles in Brazilian coastal waters described by satellite tracking and flipper tagging. Marine Ecology Progress Series. 253: 279-288.

The home range for some turtles feeding on macroalgae may encompass an area which spans 90 km of coastline.

Kinzel, M.R. Green Sea Turtle Migration in the Gulf of Mexico. In: Marine Geography - GIS for the Oceans and Seas. Breman, J. (Editor). ESRI Press.2002.

Home range for one individual was 2,745.63 sq km, while another was reported as being 336.317 sq km.

Makowski, C., J.A. Seminoff, and M. Salmon. 2006. Home range and habitat use of juvenile Atlantic green turtles (Chelonia mydas) on shallow reef habitats in Palm Beach, Florida, USA. Marine Biology. 148: 1167-1179.

Home range areas measured with 100% minimum convex polygon and 95% fixed kernel estimators varied from 0.69 to 5.05 sq km (mean = 2.38 sq km) and 0.73 to 4.89 sq km (mean = 2.09 sq km), respectively. Averaging the mean results of both methods produces a home range size of 2.24 sq km.

Mendonca, M.T. 1983. Movements and feeding ecology of immature green turtles (Chelonia mydas) in a Floida lagoon. Copeia. 1013-1023.

Average home range = 2.88 sq km.

Renaud, M.L., J.A. Carpenter. 1994. Movements and submergence patterns of loggerhead turtles (Caretta caretta) in the Gulf of Mexico determined through satellite telemetry. Bulletin of Marine Science. 55: 1-15.

Average home range = 0.77 sq km.

Schmid, J.R. A.B. Bolten, K.A. Bjorndal, W.J. Lindberg, H.F. Percival, and P.D. Zwick. 2003. Home range and habitat use by Kemp's ridley turtles in west-central Florida. Journal of Wildlife Management. 67: 196-206.

Radio and sonic telemetry were utilized on subadult Kemp's ridley turtles to investigate home-range size and habitat use in the coastal waters of west-central Florida from 1994 to 1996. Nine turtles were tracked for up to 70 days after release and were found to occupy 5-30 sq km foraging ranges.

Seminoff, J.A., A. Resendiz, W.J. Nichols. 2002. Home range of green turtles, Chelonia mydas, at a coastal foraging area in the Gulf of California, Mexico. Marine Ecology progress Series. 242: 253-265.

Average home range = 16.62 sq km.

Whiting, S.D. and J.D. Miller. 1998. Short term foraging ranges of adult green turtles (Chelonia mydas). Journal of Herpetology. 32(3): 330-337.

Adult green turtles may forage over larger areas than juveniles.
Mean foraging range = 315 ha (range = 84 - 850 ha).
Mean distance traveled per day = 3.0 km (range = 0.9 - 4.9 km).

Last researched by: Davenport

Date researched: 1/1/2007

Reptilia

Kemp's Ridley Sea Turtle
Lepidochelys kempii

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7710	Undetermined	Dead Individual Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
7711	Undetermined	Marine Telemetry: Partial Activity Range	9.6 km Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
7713	Undetermined	Occupied Habitat	9.6 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The Atlantic green, Atlantic loggerhead, and Atlantic ridley sea turtles both forage and migrate through NJ waters. While movement specific to migration is largely confined off-shore, foraging may occur both off-shore and within the neritic zone. The bulk of the scientific literature which pertains to determining a home range size, is based upon lower latitude habitats, relatively young individuals, and is predominantly focused on the Atlantic green turtle. Using the mean of the home range estimates from the studies detailed below and creating an average based upon those figures, produces a 9.6 km radius as the basis for a species occurrence area for these three species.

Literature:

Blumenthal, J.M., J.L. Soloman, C.D. Bell, T.J. Austin, G. Ebanks-Petrie, M.S. Coyne, A.C. Broderick, and B.J. Godley. 2006. Satellite tracking highlights the need for international cooperation in marine turtle management. Endangered Species Research. 7: 1-11.

Migrations of mature marine turtles typically span hundreds or thousands of kilometers.

Godley, B.J., E.H.S.M. Lima, S. Akesson, A.C. Broderick, F. Glen, M.H. Godfrey, P. Luschi, and G.C. Hays. 2003. Movement patterns of green turtles in Brazilian coastal waters described by satellite tracking and flipper tagging. Marine Ecology Progress Series. 253: 279-288.

The home range for some turtles feeding on macroalgae may encompass an area which spans 90 km of coastline.

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Home range for one individual was 2,745.63 sq km, while another was reported as being 336.317 sq km.

Makowski, C., J.A. Seminoff, and M. Salmon. 2006. Home range and habitat use of juvenile Atlantic green turtles (Chelonia mydas) on shallow reef habitats in Palm Beach, Florida, USA. Marine Biology. 148: 1167-1179.

Home range areas measured with 100% minimum convex polygon and 95% fixed kernel estimators varied from 0.69 to 5.05 sq km (mean = 2.38 sq km) and 0.73 to 4.89 sq km (mean = 2.09 sq km), respectively. Averaging the mean results of both methods produces a home range size of 2.24 sq km.

Mendonca, M.T. 1983. Movements and feeding ecology of immature green turtles (Chelonia mydas) in a Floida lagoon. Copeia. 1013-1023.

Average home range = 2.88 sq km.

Renaud, M.L., J.A. Carpenter. 1994. Movements and submergence patterns of loggerhead turtles (Caretta caretta) in the Gulf of Mexico determined through satellite telemetry. Bulletin of Marine Science. 55: 1-15.

Average home range = 0.77 sq km.

Schmid, J.R. A.B. Bolten, K.A. Bjorndal, W.J. Lindberg, H.F. Percival, and P.D. Zwick. 2003. Home range and habitat use by Kemp's ridley turtles in west-central Florida. Journal of Wildlife Management. 67: 196-206.

Radio and sonic telemetry were utilized on subadult Kemp's ridley turtles to investigate home-range size and habitat use in the coastal waters of west-central Florida from 1994 to 1996. Nine turtles were tracked for up to 70 days after release and were found to occupy 5-30 sq km foraging ranges.

Seminoff, J.A., A. Resendiz, W.J. Nichols. 2002. Home range of green turtles, Chelonia mydas, at a coastal foraging area in the Gulf of California, Mexico. Marine Ecology progress Series. 242: 253-265.

Average home range = 16.62 sq km.

Whiting, S.D. and J.D. Miller. 1998. Short term foraging ranges of adult green turtles (Chelonia mydas). Journal of Herpetology. 32(3): 330-337.

Adult green turtles may forage over larger areas than juveniles.
Mean foraging range = 315 ha (range = 84 - 850 ha).
Mean distance traveled per day = 3.0 km (range = 0.9 - 4.9 km).

Last researched by: Davenport

Date researched: 1/1/2007

Reptilia

Leatherback Sea Turtle
Dermochelys coriacea

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7714	Undetermined	Dead Individual Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
7715	Undetermined	Marine Telemetry: Partial Activity Range	25 km Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
7717	Undetermined	Occupied Habitat	25 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Leatherback turtles have the largest range of any living reptile and have been documented to travel thousands of miles within a given year (Eckert 2006). Although no nesting behavior, nor any other terrestrial activity, occurs within NJ, Atlantic leatherbacks both forage in and migrate through NJ off-shore and coastal waters. Due to the great distance which they are capable of traveling within relatively short spans of time, formulating a Species Occurrence Area (SOA) based upon a home range is difficult for a species whose home range includes an entire ocean basin. However, in order to provide a basis by which this species may best be represented within the current SOA framework, the documented average daily distance traveled will be used to determine the SOA radius. Due to the paucity of data regarding movements of leatherback turtles in the northwest Atlantic, an extremely conservative SOA radius of 25 km was chosen, based upon the lower end of the range of distance covered per day, based upon Eckert (2006).

Literature:

Blumenthal, J.M., J.L. Soloman, C.D. Bell, T.J. Austin, G. Ebanks-Petrie, M.S. Coyne, A.C. Broderick, and B.J. Godley. 2006. Satellite tracking highlights the need for international cooperation in marine turtle management. Endangered Species Research. 7: 1-11.

Migrations of mature marine turtles typically span hundreds or thousands of kilometers.

Eckert, S.A. 2006. High-use oceanic areas for Atlantic leatherback sea turtles (Dermochelys coriacea) as identified using satellite telemetered location and dive information. Marine Biology. 149: 1257-1267.

Nine adult females were tagged with satellite transmitters while they nested on the Caribbean Island of Trinidad. Study animals ranged as far as the Flemish Cap, the Bay of Biscay, and off the coast of northwestern Africa. Dividing each study animal’s minimum distance traveled by the number of days in which it was tracked, produces a range of 23.69-43.08 km traveled per day and a mean of 34.75 km/day.

Last researched by: Davenport

Date researched: 1/1/2007

Reptilia

Little Brown Skink
Scincella lateralis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7973	Not applicable	On Road	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5719	Not applicable	Occupied Habitat	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8631	Not applicable	Hibernaculum	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8632	Not applicable	Nesting Area	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

Scincella lateralis is primarily found within upland forest habitat among leaf litter and debris. Previously reported home range sizes for S. lateralis are relatively small, with male home ranges being approximately 3.5 times larger than those of females. Typically, one male's home rage will overlap with the ranges of several females. Brooks (1967) reported S. lateralis home range sizes as 52 $m^2 \pm 6$ m^2 for males and 14 $m^2 \pm 2$ m^2 for females. Other studies have demonstrated average daily movements of approximately 10 m for this species. Occasionally, S. lateralis will shift their home ranges up to a few hundred meters. Therefore, in order to capture the actively used area for S. lateralis, a sighting buffer of 200 meters is applied.

Literature:

Brooks, G.R. 1967. Population ecology of the ground skink, Lygosoma laterale (Say). Ecological Monographs, 37(2): 71-87.

Becker BM, Paulissen MA. 2012. Sexual dimorphism in head size in the Little Brown Skink (Scincella lateralis). Herp Con Bio. 7:109-14.

Fitch, Henry S., and Pennie L. von Achen. 1977. "Spatial Relationships and Seasonality in the Skinks Eumeces fasciatus and Scincella laterale in Northeastern Kansas." Herpetologica 33(3): 303–313.

Grant, Bruce W., et al. 1992. "The use of coverboards in estimating patterns of reptile and amphibian biodiversity." Wildlife 2001: populations. Springer, Dordrecht. 379-403.

NatureServe. 2017. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://explorer.natureserve.org.

Last researched by:	Zarate
Date researched:	3/22/2018

Reptilia

Loggerhead Sea Turtle
Caretta caretta

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
7706	Undetermined	Dead Individual Sighting	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
7707	Undetermined	Marine Telemetry: Partial Activity Range	9.6 km Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
7708	Undetermined	Nesting Area	71.25 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	No
7709	Undetermined	Occupied Habitat	9.6 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The Atlantic green, Atlantic loggerhead, and Atlantic ridley sea turtles both forage and migrate through NJ waters. While movement specific to migration is largely confined off-shore, foraging may occur both off-shore and within the neritic zone. The bulk of the scientific literature which pertains to determining a home range size, is based upon lower latitude habitats, relatively young individuals, and is predominantly focused on the Atlantic green turtle. Using the mean of the home range estimates from the studies detailed below and creating an average based upon those figures, produces a 9.6 km radius as the basis for a species occurrence area for these three species.

Literature:

Blumenthal, J.M., J.L. Soloman, C.D. Bell, T.J. Austin, G. Ebanks-Petrie, M.S. Coyne, A.C. Broderick, and B.J. Godley. 2006. Satellite tracking highlights the need for international cooperation in marine turtle management. Endangered Species Research. 7: 1-11.

Migrations of mature marine turtles typically span hundreds or thousands of kilometers.

Godley, B.J., E.H.S.M. Lima, S. Akesson, A.C. Broderick, F. Glen, M.H. Godfrey, P. Luschi, and G.C. Hays. 2003. Movement patterns of green turtles in Brazilian coastal waters described by satellite tracking and flipper tagging. Marine Ecology Progress Series. 253: 279-288.

The home range for some turtles feeding on macroalgae may encompass an area which spans 90 km of coastline.

Kinzel, M.R. Green Sea Turtle Migration in the Gulf of Mexico. In: Marine Geography - GIS for the Oceans and Seas. Breman, J. (Editor). ESRI Press.2002.

Home range for one individual was 2,745.63 sq km, while another was reported as being 336.317 sq km.

Makowski, C., J.A. Seminoff, and M. Salmon. 2006. Home range and habitat use of juvenile Atlantic green turtles (Chelonia mydas) on shallow reef habitats in Palm Beach, Florida, USA. Marine Biology. 148: 1167-1179.

Home range areas measured with 100% minimum convex polygon and 95% fixed kernel estimators varied from 0.69 to 5.05 sq km (mean = 2.38 sq km) and 0.73 to 4.89 sq km (mean = 2.09 sq km), respectively. Averaging the mean results of both methods produces a home range size of 2.24 sq km.

Mendonca, M.T. 1983. Movements and feeding ecology of immature green turtles (Chelonia mydas) in a Floida lagoon. Copeia. 1013-1023.

Average home range = 2.88 sq km.

Renaud, M.L., J.A. Carpenter. 1994. Movements and submergence patterns of loggerhead turtles (Caretta caretta) in the Gulf of Mexico determined through satellite telemetry. Bulletin of Marine Science. 55: 1-15.

Average home range = 0.77 sq km.

Schmid, J.R. A.B. Bolten, K.A. Bjorndal, W.J. Lindberg, H.F. Percival, and P.D. Zwick. 2003. Home range and habitat use by Kemp's ridley turtles in west-central Florida. Journal of Wildlife Management. 67: 196-206.

Radio and sonic telemetry were utilized on subadult Kemp's ridley turtles to investigate home-range size and habitat use in the coastal waters of west-central Florida from 1994 to 1996. Nine turtles were tracked for up to 70 days after release and were found to occupy 5-30 sq km foraging ranges.

Seminoff, J.A., A. Resendiz, W.J. Nichols. 2002. Home range of green turtles, Chelonia mydas, at a coastal foraging area in the Gulf of California, Mexico. Marine Ecology progress Series. 242: 253-265.

Average home range = 16.62 sq km.

Whiting, S.D. and J.D. Miller. 1998. Short term foraging ranges of adult green turtles (Chelonia mydas). Journal of Herpetology. 32(3): 330-337.

Adult green turtles may forage over larger areas than juveniles.
Mean foraging range = 315 ha (range = 84 - 850 ha).
Mean distance traveled per day = 3.0 km (range = 0.9 - 4.9 km).

Last researched by: Davenport

Date researched: 1/1/2007

Reptilia

Northern Diamond-backed Terrapin
Malaclemys terrapin terrapin

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5099	Not applicable	Occupied Habitat	750 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5101	Not applicable	Hibernaculum	750 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5102	Not applicable	Nesting Area	750 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
5103	Not applicable	On Road	750 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes

Justification:

Very little information is known on the movement patterns and home range of this cryptic species. There is a high variability noted in the distance traveled by individuals, with sex and age of the individual noted as potential factors influencing this behavior. Generally speaking, only females emerge from the water in order to nest. Foraging, mating and movements not related to nesting are generally confined to water within salt marsh habitat.

Calculated home ranges ranged from 409-416 m (Butler 2002) to 896-986 m (Spivey 1998). Using the home ranges 52.62 ha, 54.33 ha, 176.7 ha, 252.1 ha, 305.4 ha (Butler 2002, Harden 2007, and Spivey 1998, respectively), the mean home range is approximately 168.2 ha, equivalent to an approximate 732 meter radius. ENSP has accepted a conservative estimate by rounding this range territory to a 750 m radius, which brings the occurrence area closer to the inferred minimum extent noted by NatureServe (2008)

Literature:

Butler, Joseph A. 2002. Population Ecology, Home Range, and Seasonal Movements of the Carolina Diamondback Terrapin, Malaclemys terrapin centrata, in Northeastern Florida. Final Report for the Bureau of Wildlife Diversity Conservation, Florida Fish and Wildlife Conservation Commission.

The mean home range calculations for the 95% isopleth for both the minimum convex polygon and adaptive kernel methods of a study in northeastern Florida, even considering their large standard deviations, are much lower than those found in North Carolina (Spivey 1998). The North Carolina study took place in a marsh which had been altered in the 1950s by over 700 km of artificial ditches. Spivey (1998) suggested that this ditching may have expanded terrapin home ranges by allowing longer straight-line movements, connecting foraging centers and thus increasing the number of activity centers, or simply rendering some areas suboptimal and thus requiring larger ranges to meet terrapin needs.
The mean home range calculation for the 95% isopleth for the minimum convex polygon and adaptive kernel methods was found to be 54.33 ha and 52.62 ha respectively

Harden, L. A. N. A. Diluzio, J. W. Gibbons, and M. E. Dorcas. 2007. Spatial and thermal ecology of the diamondback terrapin (Malacelmys terrapin) in a South Carolina salt marsh.

Journal of the North Carolina Academy of Sciences. 123:154-162.

A radiotelemetry study within a South Carolina salt marsh moved a mean total distance of 750 meters with individual total distances moved ranging from 440 to 1159 meters.

NatureServe. 2008. NatureServe Explorer: An online encyclopedia of life (web application). Version 7.0. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer. (Accessed: December 2, 2008).

The inferred minimum extent of habitat use (when actual extent is unknown) is 1 km.

Spivey, P. B. 1998. Home range, habitat selection, and diet of the diamondback terrapin (Malaclemys terrapin) in a North Carolina estuary. Thesis, University of Georgia, Athens, Georgia, USA.

A telemetry study in North Carolina tracked 29 adult diamondback terrapins to estimate home range and examine habitat selection in a ditched estuary. Eighty-six percent of all telemetry locations were within ditched marsh. The mean home range calculation for the 95% isopleth for the minimum convex polygon and adaptive kernel methods was found to be 305.4 ha and 252.1 ha respectively.

Last researched by: Davenport

Date researched: 12/1/2008

Reptilia

Northern Pinesnake
Pituophis melanoleucus melanoleucus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4899	Not applicable	Gestation Site	10 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4900	Not applicable	Telemetry: Home Range	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
4901	Not applicable	Hibernaculum	1.1 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4902	Not applicable	On Road	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4903	Not applicable	Nesting Area	1.1 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4904	Not applicable	Occupied Habitat	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4905	Not applicable	Telemetry: Partial Activity Range	1.0 Kilometer Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4906	Not applicable	Occurrence by Den	1.1 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size, or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through ENSP research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. There has been a significant amount of research conducted on northern pine snakes (Pituophis melanoleucus melanoleucus) in NJ and as such, the focus of the literature review for this assessment included only NJ-based studies.

Minimum convex polygon home range data (Row and Blouin-Demers 2006) for northern pine snakes from available literature was reviewed. A number of studies presented the mean activity ranges for their study sets: 28.9 - 407.77-ha (Burger and Zappalorti 2011), 34.3 - 137.4-ha with a mean of 70.0-ha (Smith 2013), 37.7 + 5.0-ha for seven snakes tracked over two years and 70.0 + 6.9-ha for 11 snakes tracked over two years (Smith et al. 2015), 55 - 258-ha with a mean of 105.51-ha (Zappalorti et al. 2015), 15 - 200-ha with a mean of 92.63 + 8.08-ha (Ward 2015). Although it has been well documented that northern pine snakes (among other species) shift their movements annually often retaining a smaller “core” area (Smith 2013, Zappalorti et al. 2014, Zappalorti et al. 2015) but dispersing in different directions and/or distances from year to year, most studies present annual activity ranges and/or the mean activity range by calculating the mean from the area used by the snakes each year rather than collectively over the course of the study (i.e., each year of data for a snake tracked multiple years is treated as an individual – replicate - activity range and all are averaged). In addition, some studies' analyses included activity ranges for snakes tracked a single year. Zappalorti et al. (2015) reported that home range size generally increased as the tracking period increased (i.e., the more tracking years, the larger each snake's overall activity range); likely a result of the snakes annual shifting. Only Zappalorti et al. (2014) and Zappalorti et al. (2015) considered the annual shifting of each snake's activity range as part of the larger, comprehensive home range for each snake rather than as separate metrics to be averaged together. As such, relocation data over multiple years for each telemetered snake was compiled into a single dataset for each snake to calculate and identify a more accurate representation of each snake's activity range [i.e., the minimum (given the data is restricted to a few years of the snakes' lives) habitat used/needed throughout their lives]. Furthermore, Zappalorti et al. (2014) demonstrates that locations appearing to be "outliers" in any given year, are areas used by the same snakes in other years indicating that these are not locations whereby snakes are conducting "exploration" (and consequently, are to be removed from analyses) but are part of the snake's normal activity range and should be included in analyses when calculating the snake's activity range. Relocation data presented by Zappalorti et al. (2015), however, was limited; most study snakes were located less than 70 times over multiple years suggesting that tracking was not consistently done throughout each season which could have limited the activity range calculations by inadvertently missing some of the snakes' movements. In addition, some snakes were not tracked in consecutive years and therefore, it is unclear what portion of each active season the snakes were tracked (i.e., the same time each year, span over the entire active period, etc.) which can also affect the results. Conversely, the number of relocations for each snake presented by Zappalorti et al. (2014) indicates more consistent tracking and therefore, is likely a more accurate representation of the snakes' activity range over time and as such, this data is the focus of this assessment. Based on the Zappalorti et al. (2014), 12 adult males that were tracked multiple years had a mean activity range of 370.17-hectares and 10 females had a mean activity range of 284.85-hectares. Mean maximum dispersal distances from hibernacula have been reported as 1535 + 95-m (Ward 2015) and 1321.05-m (Zappalorti et al. 2015).

Critical habitat features (i.e., hibernacula and nesting areas) and sites identified as "Occurrence by Den…" which relate to observations during egress and ingress where snakes bask proximate to hibernacula are generally more defined areas than random observations. However, multiple dens in a localized area can create a den complex whereby snakes shift among the associated dens/hibernacula during ingress and winter, but also from year to year. Given the importance of hibernacula as a "starting point" for any local population, male activity ranges, which are often larger than female ranges, were used to develop an appropriate buffer for such observations. Using the Zappalorti et al. (2014) activity ranges for male snakes that were tracked multiple years and appearing to have been consistently tracked throughout those years, resulted in a mean activity range of 370.17-ha. This activity range estimate was converted into an estimate of square meters and assumed to be circular in configuration to calculate the appropriate representative buffer (radius of the circular activity range) resulting in a radius of 1,085.49-meters (rounded to 1.1-km) to be applied to the feature labels "Hibernaculum" and "Occurrence by Den."

Nesting areas are also considered critical habitat features. However, in addition to their importance for nesting, it appears hibernacula are often proximate to these areas (Burger et al. 1988, Smith 2014). Burger et al. (1988) reported seven winter hibernacula were located within 100-meters of nesting areas and Smith (2014) found, regarding hatchlings, that "all first season hibernacula were within 280 meters of respective nest sites with 71% of hibernacula (5 out of 7) within 100 meters of nest sites." Although Smith's (2014) study had a small sample set, when taken into consideration with the findings regarding nest area proximity to winter dens by Burger et al. (1988), it indicates that areas adjacent to nest sites require similar protective measures during winter hibernation as documented hibernacula. As such, the feature label "Nesting Area" has been assigned the same buffer as hibernacula to more accurately represent the importance of the surrounding habitat to this species.

Northern pine snakes are oviparous and therefore, the feature label "Gestation Site" does not apply to this species.

"Occupied Habitat" and "Dead on Road" refer to random sightings whereby it is impossible to determine the snake's den location or activity range. Annual activity ranges are highly variable as reported through New Jersey-based radio-telemetry studies. Burger and Zappalorti (2011) reported home ranges from 28.9 - 407.77-hectares, Ward (2015) reported ranges from 15 - 200-hectares, and Zappalorti et al. (2015) reported ranges from 55 - 258-hectares with an average of 105.51-hectares. Lacking raw data and details regarding tracking efforts and timelines (i.e., partial vs. complete season, tracking frequency, etc.) from the various studies, activity range data (males and females) presented by Zappalorti et al. (2014) has been recalculated resulting in a mean activity range of 331.39-ha. This activity range estimate was converted into an estimate of square meters and assumed to be circular in configuration to calculate the appropriate representative buffer (radius of the circular activity range) resulting in a radius of 1,027.06-meters (rounded to 1.0-km) to be applied to these feature labels.

"Telemetry: Home Range" and "Telemetry: Partial Activity Range" refers to observation locations collected through radio-telemetry studies; "home range" referring to snakes whereby a full season of data was collected, "partial activity range" referring to snakes whereby only part of the snake's active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry. Since activity ranges for this species are irregular in shape and somewhat oblong (Smith 2013, Zappalorti et al. 2014, Zappalorti et al. 2015) rather than circular, it is likely these buffers underestimate the habitat used by this species.

Literature:

Burger, J. and R.T. Zappalorti. 2011. The Northern Pine Snake (Pituophis Melanoleucus) in New Jersey: Its Life History, Behavior and Conservation. In: Reptiles: Biology, Behavior and Conservation. Edited by: Kristen J. Baker. Nova Science Publishers, Inc.

-States activity home range data of 20 telemetered pine snakes in 2009 varied from 28.9 to 391.4-hectares.
-States activity home range data of 16 telemetered pine snakes in 2010 ranged from 91.35 to 407.77-hectares.
-Of the 16 radio-tracked pine snakes, 11 had home ranges greater than 100-hectares, whereas four snakes had home ranges larger than 200-hectares

Burger, J., R.T. Zappalorti, M. Gochfeld, W. Boarman, M. Caffrey, V. Doig, S. Garber, B. Lauro, M. Mikovsky, C. Safina, and J. Saliva. 1988. Hibernacula and Summer Den Sites of Pine Snakes (Pituophis melanoleucus) in the New Jersey Pine Barrens. Journal of Herpetology 22(4):425-433.

Seven winter hibernacula were located within 100-meters of nesting areas.

Row, J.R. and G. Blouin-Demers. 2006. Kernels are not accurate estimators of home-range size for herpetofauna. Copeia 20016(4):797-802.

-Describes the potential problems using kernel home-range estimators versus minimum convex polygon when working with reptiles and amphibians.

Smith, R.M. 2013. Spatial Ecology of the Timber Rattlesnake (Crotalus horridus) and Northern Pine
Snake (Pituophis melanoleucus) in the Pine Barrens of New Jersey. PhD Thesis. Drexel

University. 122 pp

-Northern pine snakes' home range maps illustrate non-circular ranges and annual shifting in activity range while maintaining a core area.
-Reported activity ranges of 34.3 - 137.4-ha with a mean of 70.0-ha

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Ward, D.C. 2015. Population Ecology of Northern Pinesnake, Pituophis melanoleucus, in the Pine Barrens of New Jersey. PhD Thesis. Drexel University. 109 pp.

-Mean maximum dispersal distance from the hibernacula was reported as 1535 + 95-m.
-MCP activity range was reported as 15 - 200-ha with a mean MCP activity range of 92.63 + 8.08-ha.

Zappalorti, R.T., D. Burkett, M. McCort, D. Schneider, and K. Schantz. 2014. Final Northern Pine Snake Monitoring and Radio-tracking Report, Conducted at the Stafford Business Park, Stafford Township, Ocean County, New Jersey. March 14, 2014. 182 pp.

-Northern pine snakes' home range maps illustrate non-circular ranges and annual shifting in activity ranges.
-Presented MCPs for each snakes' multi-year activity range.

Snake ID	Sex	Years Telemetry Data Collected	Snake Status	MCP home range (ha)
2007.09	Male	2007, 2008, 2009, 2010	died in 2012	623.40
2007.10	Male	2007, 2008, 2009, 2010, 2012	died in 2012	310.90
2007.11	Male	2007, 2008, 2009, 2010, 2011, 2012, 2013	died in 2013	263.40
2007.14	Male	2007, 2008, 2009, 2010, 2011, 2013	alive in 2014	420.00
2008.02	Male	2008, 2009, 2010	died in 2011	592.90
2009.13	Male	2009, 2010, 2013	alive in 2014	238.80
2006.11	Male	2007, 2008, 2009	died in 2009	357.90
2006.16	Male	2008, 2009, 2010, 2011, 2012, 2013	alive at end of study	324.60
2006.26	Male	2007, 2008, 2009, 2010	missing in 2010	359.80
2006.34	Male	2007, 2008, 2009, 2010, 2011, 2012	died in 2012	427.00
2006.49	Male	2011, 2012, 2013		101.80
2006.108	Male	2010, 2011, 2012, 2013	alive at end of study	421.50
2007.04	Female	2007, 2008, 2009	died in 2009	265.40
2007.15	Female	2007, 2008, 2009	died in 2009	334.70
2008.03	Female	2008, 2009, 2010	died in	

2012 485.10
2006.08 Female 2008, 2009, 2010 missing in
2011 192.40
2006.09 Female 2007, 2008, 2009
246.00
2006.19 Female 2008, 2009, 2010, 2011 died in
2012 54.70
2006.21 Female 2007, 2008, 2009 died in
2009 500.50
2006.28 Female 2008, 2009, 2010 died in
2010 271.90
2006.29 Female 2008, 2009, 20103
58.50
2006.32 Female 2007, 2008, 2009 died in
2010 139.30

Zappalorti, R.T., J. Burger, and F. Peterson. 2015. Home Range Size and Disturbance Traveled from Hibernacula in Northern Pinesnakes in the New Jersey Pine Barrens. Herpetologica 71(1); 26-36.

-Northern pine snakes' home range maps illustrate non-circular ranges and annual shifting in activity ranges.
-Presented MCPs for each snakes' multi-year activity range.
-Average MCP home range of 105.51-ha based on 14 radio-tracked snakes with >30 relocations.
-Adult male had the largest home range of 258.0-ha.
-Average maximum distance traveled from hibernaculum (range length) was 1,320.05-m; furthest an adult male traveled from the hibernaculum was 2,146.91-m, furthest an adult female traveled from the hibernaculum was 1,171.75-m.
-Ten-year study of 39 northern pine snakes revealed this study set used a combined area of 980.0-ha.
-Reported that in general, home range size tended to increase with an increased duration of telemetry. Snakes tracked for more than two years had larger home ranges than those tracked for one year.

Last researched by: Schantz

Date researched: 11/15/2021

Reptilia

Northern Scarletsnake
Cemophora coccinea copei

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6807	Not applicable	Occurrence by Den	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6808	Not applicable	Hibernaculum	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6809	Not applicable	Telemetry: Home Range	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6810	Not applicable	Telemetry: Partial Activity Range	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6811	Not applicable	On Road	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6812	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6813	Not applicable	Nesting Area	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6814	Not applicable	Gestation Site	10 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through the NJ Endangered and Nongame Species Program (ENSP) research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. However, such literature for scarlet snake (Cemophora coccinea) is lacking. NatureServe (2018) identifies the scarlet snake (Cemophora coccinea) as having a minimum inferred extent of 0.5-kilometers (500-meters); i.e., the distance to buffer an observation. Lacking additional details, a 500-meter buffer has been applied to all applicable feature labels. Since home ranges for snakes are not circular and instead are often somewhat oblong, it is likely these buffers underestimate the habitat used by this species.

Scarlet snakes are oviparous and therefore, the feature label “gestation site” does not apply to this species. “Telemetry: Home Range” and “Telemetry: Partial Activity Range” refers to observation locations collected through radio-telemetry studies; “home range” referring to snakes whereby a full season of data was collected, “partial activity range” referring to snakes whereby only part of the snake’s active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Literature:

NatureServe. 2018. NatureServe Explorer: Population/Occurrence Delineation Report An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, VA. Available at: http://explorer.natureserve.org/servlet/NatureServe?searchName=Cemophora+coccinea [Accessed September 09, 2018.]

Last researched by: Schantz

Date researched: 11/15/2021

Reptilia

Queensnake
Regina septemvittata

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4891	Not applicable	Nesting Area	Hand Digitized Polygon	Stays as is	Stays as is	Stays as is	Yes
4892	Not applicable	Occupied Habitat	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4893	Not applicable	Occurrence by Den	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4894	Not applicable	Hibernaculum	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4895	Not applicable	Telemetry: Home Range	200 Meter Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
4896	Not applicable	Gestation Site	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4897	Not applicable	Telemetry: Partial Activity Range	200 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4898	Not applicable	On Road	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through the NJ Endangered and Nongame Species Program (ENSP) research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. However, such literature for queen snake (Regina septemvittata) is lacking. NatureServe (2022) identifies the queen snake (Regina septemvittata) as having a minimum inferred extent of 0.2-kilometers (200-meters); i.e., the distance to buffer an observation. Lacking additional details, a 200-meter buffer has been applied to all applicable feature labels. Since home ranges for snakes are not circular and instead are often somewhat oblong, it is likely these buffers underestimate the habitat used by this species.

Queen snakes are ovoviviparous and therefore, the feature label “nesting area” does not apply to this species. “Telemetry: Home Range” and “Telemetry: Partial Activity Range” refers to observation locations collected through radio-telemetry studies; “home range” referring to snakes whereby a full season of data was collected, “partial activity range” referring to snakes whereby only part of the snake’s active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Literature:

NatureServe. 2022. NatureServe Network Biodiversity Location Data accessed through NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available at: http://explorer.natureserve.org/Taxon/ELEMENT_GLOBAL.2.102448/Regina_septemvittata

[Accessed September 7, 2022.

Last researched by: Schantz

Date researched: 11/1/2022

Reptilia

Red Cornsnake

Pantherophis guttatus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4883	Not applicable	Occurrence by Den	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4884	Not applicable	Telemetry: Partial Activity Range	500 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4885	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
4886	Not applicable	Nesting Area	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4887	Not applicable	On Road	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4888	Not applicable	Telemetry: Home Range	500 Meter Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
4889	Not applicable	Gestation Site	10 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4890	Not applicable	Hibernaculum	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through the NJ Endangered and Nongame Species Program (ENSP) research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. However, such literature for corn snake (Elaphe guttata guttata) is lacking. NatureServe (2018) identifies the corn snake (Elaphe guttata guttata) as having a minimum inferred extent of 500-m; i.e., the distance to buffer an observation. Mr. Robert Zappalorti and Dr. Howard Reinert are conducting a corn snake telemetry study in NJ's pine barrens (2016-2019). They have found the corn snakes move more than 500-m from their winter dens (Howard Reinert, pers. comm. 2018). Awaiting publication of Zappalorti and Reinert's findings, this assessment defers to NatureServe's inferred extent; i.e., a 500-meter buffer has been applied to all applicable feature labels. Since home ranges are not circular and instead are often somewhat oblong, it is likely these buffers underestimate the habitat used by this species.

Corn snakes are oviparous and therefore, the feature label "gestation site" does not apply to this species.

"Telemetry: Home Range" and "Telemetry: Partial Activity Range" refers to observation locations collected through radio-telemetry studies; "home range" referring to snakes whereby a full season of data was collected, “partial activity range” referring to snakes whereby only part of the snake’s active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake’s movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points (“Occupied Habitat” and “Dead on Road”) in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points (“Occupied Habitat” and “Dead on Road”) in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake’s movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Literature:

NatureServe. 2018. NatureServe Explorer: Population/Occurrence Delineation Report An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, VA. Available at: http://explorer.natureserve.org/servlet/NatureServe?searchName=Pantherophis+guttatus

Last researched by: Schantz

Date researched: 11/15/2021

Reptilia

Rough Greensnake
Opheodrys aestivus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6847	Not applicable	Hibernaculum	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6848	Not applicable	Occurrence by Den	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6849	Not applicable	Nesting Area	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6850	Not applicable	Telemetry: Home Range	500 Meter Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
6851	Not applicable	On Road	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6852	Not applicable	Telemetry: Partial Activity Range	500 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
6853	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6854	Not applicable	Gestation Site	10 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through the NJ Endangered and Nongame Species Program (ENSP) research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. However, such literature for rough green snakes (Opheodrys aestivus) is lacking. NatureServe (2018) identifies the smooth green snake as having a minimum inferred extent of 0.5-kilometers (500-meters); i.e., the distance to buffer an observation. Lacking additional details, a 500-meter buffer has been applied to all applicable feature labels. Since home ranges for snakes are not circular and instead are often somewhat oblong, it is likely these buffers underestimate the habitat used by this species.

Rough green snakes are oviparous and therefore, the feature label “gestation site” does not apply to this species.
“Telemetry: Home Range” and “Telemetry: Partial Activity Range” refers to observation locations collected through radio-telemetry studies; “home range” referring to snakes whereby a full season of data was collected, “partial activity range” referring to snakes whereby only part of the snake’s active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a

complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Literature:

NatureServe. 2018. NatureServe Explorer: Population/Occurrence Delineation Report An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, VA. Available at: http://explorer.natureserve.org/servlet/NatureServe?searchName=Opheodrys+aestivus [Accessed August 22, 2018.]

Last researched by: Schantz

Date researched: 11/15/2021

Reptilia

Smooth Greensnake

Opheodrys vernalis

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
6839	Not applicable	On Road	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6840	Not applicable	Nesting Area	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6841	Not applicable	Gestation Site	10 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6842	Not applicable	Telemetry: Home Range	200 Meter Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
6843	Not applicable	Occurrence by Den	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6844	Not applicable	Hibernaculum	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6845	Not applicable	Occupied Habitat	200 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
6846	Not applicable	Telemetry: Partial Activity Range	200 Meter Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through the NJ Endangered and Nongame Species Program (ENSP) research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. However, such literature for smooth green snakes (Opheodrys vernalis formerly Liochlorophis vernalis) is lacking. NatureServe (2018) identifies the smooth green snake as having a minimum inferred extent of 0.2-kilometers (200-meters); i.e., the distance to buffer an observation. Lacking additional details, a 200-meter buffer has been applied to all applicable feature labels. Since home ranges are not circular and instead are often somewhat oblong, it is likely these buffers underestimate the habitat used by this species.

Smooth green snakes are oviparous and therefore, the feature label “gestation site” does not apply to this species.
“Telemetry: Home Range” and “Telemetry: Partial Activity Range” refers to observation locations collected through radio-telemetry studies; “home range” referring to snakes whereby a full season of data was collected, “partial activity range” referring to snakes whereby only part of the snake’s active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a

complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Literature:

NatureServe. 2018. NatureServe Explorer: Population/Occurrence Delineation Report An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, VA. Available at: http://explorer.natureserve.org/servlet/NatureServe?searchName=Liochlorophis+vernalis [Accessed August 22, 2018.]

Last researched by: Schantz

Date researched: 11/15/2021

Reptilia

Spotted Turtle
Clemmys guttata

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5089	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5090	Not applicable	Hibernaculum	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5091	Not applicable	Nesting Area	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5092	Not applicable	On Road	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5093	Not applicable	Vernal Pool	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The spotted turtle, Clemmys guttata, frequents a variety of wetland habitat types throughout its range, although terrestrial habitat use is documented. 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. In some cases, females will move large distances from wetlands to find suitable nesting areas.

Literature:

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

Inferred minimum extent of habitat use for this species is 500 meters.

Last researched by: Zarate

Date researched: 1/1/2006

Reptilia

Timber Rattlesnake
Crotalus horridus

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
8608	Not applicable	Nesting Area (North)	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8609	Not applicable	Nesting Area (South)	1.0 Kilometer Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8610	Not applicable	Gestation Site (North)	.5 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8611	Not applicable	Hibernaculum (North)	3 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8612	Not applicable	Hibernaculum (South)	4.7 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8613	Not applicable	Occurrence by Den (North)	3 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8614	Not applicable	Occurrence by Den (South)	4.7 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8615	Not applicable	On Road (North)	.85 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8616	Not applicable	On Road (South)	1.2 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8617	Not applicable	Occupied Habitat (North)	.85 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8618	Not applicable	Occupied Habitat (South)	1.2 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
8619	Not applicable	Telemetry: Home Range (North)	.85 km Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes
8620	Not applicable	Telemetry: Home Range (South)	1.2 km Buffer	Apply a buffer	Apply a buffer	Stays as is	Yes

8621	Not applicable	Telemetry: Partial Activity Range (North)	.85 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
8622	Not applicable	Telemetry: Partial Activity Range (South)	1.2 km Buffer	Apply a buffer	Apply a buffer	Apply a buffer	Yes
8623	Not applicable	Gestation Site (South)	1.4 km Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The species occurrence area is generally based on the average home range/territory size or other appropriate life-history parameter as reported in peer-reviewed scientific literature or from information obtained through the NJ Endangered and Nongame Species Program (ENSP) research. When searching the scientific literature to gather information to support the occurrence area polygon size, efforts were made to select research that was conducted in habitat types similar to those found in NJ. Timber rattlesnakes inhabit the mountains of northern New Jersey and the Pine Barrens of southern New Jersey; uniquely different landscapes. Their winter dens in the north and Pine Barrens and gestation and birthing areas in the north are considered ancestral sites (used for generations), while gestation and birthing areas in the Pine Barrens appear to be selected more opportunistically. The habitats are significantly different between the two regions. Additionally, Timber rattlesnakes' activity ranges vary according to sex, age class and and annual movements. Telemetry research has also shown that reproductively mature males (and less typically, non-gravid females) will travel greater distances, and therefore maintain larger activity ranges, in search of food, basking areas, and mates (Brown 1993, Martin 1993, ENSP 2000, 2006, Michell 2006). The NJ Endangered and Nongame Species Program (ENSP) research (ENSP 2006) showed that sub-adult males can also venture farther than non-gravid females and that while gravid females have smaller activity ranges, they may venture out to forage early in the season but will return to their gestation site sometime between June and early August and move to their birthing rookery which is closer to their winter hibernaculum (if at a different location than their gestation site) by early to mid-August.

Timber rattlesnakes are ovoviviparous and therefore, the feature label "nesting area" does not apply to this species.

Northern range:
NatureServe (2018) identifies the timber rattlesnake as having a minimum inferred extent of 3.0-kilometers (1.86-miles); i.e., the distance to buffer an observation. However, a literature compilation by Brown (1993), explains that the majority of a den's population will use the habitat within a 2.4-km (1.5-mile) radius of the snake's den with some of the larger males venturing beyond this distance in search of mates. The ENSP (2000, 2006, 2008) telemetry research supports both of these findings as most telemetered males remained within 3.0-km (1.86-miles) of their dens while two mature males traveled 3.5-km (2.17-mi) and 3.1-km (1.93-mi) from their dens prior to and during the peak breeding seasons and a male believed to be a sub-adult traveled 4.2-km (2.6-miles) from his den in late summer. This indicates that NatureServe's inferred extent would more accurately reflect that habitat use of most individuals from a den population and as such, has been applied to the feature labels "Hibernaculum (North)" and "Occurrence by Den (North)."

Gestation sites are often near the den but can be up to 500-m (0.3-mi) from a female's den (Martin 1993), while birthing areas are [on average] within a few hundred meters of the den (Martin 1992, ENSP 2000). To more accurately reflect a gestating female's activity range and that includes her den, a 500-m (0.5-km) radius buffer is applied to observations of identified gestation sites and birthing sites [i.e., the "Gestation Site (North)" feature label].

Minimum convex polygon home range data (Row and Blouin-Demers 2006) for timber rattlesnakes from available literature and the ENSP's research was reviewed for the remaining feature label buffers. "Occupied Habitat (North)" and "On Road (North)" refers to random sightings of rattlesnakes whereby it is [typically] impossible to confirm the snake's origin (hibernaculum/den location), however in New Jersey's mountainous areas, the rattlesnakes den on the mountain slopes. As such, for some random observations, the ENSP has a general understanding of where the snakes originated or at least, from which direction they originated. In addition, the majority of the rattlesnakes' ranges remain on conserved or otherwise protected or military lands although some snakes disperse into neighboring residential communities (ENSP 2000, ENSP 2006, ENSP 2008, ENSP 2018). For the purpose of creating a reasonable buffer that could be applied to such "random" timber rattlesnake observations to more accurately approximate habitat uses by the population, only male activity ranges have been reviewed and used to create a buffer for these feature labels as males have larger activity ranges than females (Brown 1993, ENSP 1999, 2000). Brown (1993) reported NJ males having a mean activity range of 207-ha. However, the combined telemetry data of the ENSP (2000, 2006) and Michell (2006) showed adult males to have a mean activity range of 227.36-ha. This activity range estimate (227.36-ha) wwas converted into an estimate of square meters and assumed to be circular in configuration. The buffer distance (radius of the circular activity range) was then calculated resulting in a radius of 851-m (rounded to 0.85-km) for such random observations.

Since activity ranges for this species are irregular in shape and somewhat oblong (Bushar et al. 1998, Endangered and Nongame Species Program 2000, 2006, 2008) rather than circular, it is likely these buffers underestimate the area used by this species.

"Telemetry: Home Range" and "Telemetry: Partial Activity Range" refers to observation locations collected through radio-telemetry studies; "home range" referring to snakes whereby a full season of data was collected, "partial activity range" referring to snakes whereby only part of the snake's active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Pine Barrens:

Timber rattlesnake hibernacula in the Pine Barrens are not as defined as they are in montane habitats. The rattlesnakes use underground rodent burrows and root-systems to access overwintering "cavities" within stream and cedar swamp embankments and within the associated forested floodplains. While a single cavity may be an overwintering site for as few as one rattlesnake, a stream segment stretching a mile may have multiple overwintering cavities and collectively, that segment is considered one den (or den complex).

Due to the topography differences between the regions, Pine Barrens' rattlesnakes generally appear to – but do not necessarily - move greater distances than their northern counterparts. The documented range lengths for Pine Barrens rattlesnakes (i.e., the maximum distance an individual moves between its winter den and its seasonally-occupied habitats) varies both among rattlesnakes as well as each individual's annual movements (Reinert and Zappalorti 1988, Laidig and Golden 2004, New Jersey Conservation Foundation 2006, 2007, 2010, 2011, 2013, Smith et al. 2008, New Jersey Conservation Foundation and Herpetological Associates, Inc. 2010). For radio-tracked adult males and nongravid females, maximum distances from dens have ranged from 0.83 to 5.8-km and 0.6 to 5.12-km, respectively (Laidig and Golden 2004, Reinert and Zappalorti 1988, Smith et al. 2008, NJ Conservation Foundation 2010). However, in 2009 and 2010, a radio-tracked male was documented to have a range length of 10.65-km (New Jersey Conservation Foundation and Herpetological Associates, Inc., 2009, 2010). This male was not tracked through an entire season either year and as such, it's possible he moved further. Further demonstrating the variability of this species' movements, some gravid rattlesnakes will remain at gestation/brooding sites until parturition, while others may move closer to their own den complex to give birth. Rookeries (birthing sites) are usually 0.5 to 1.6-km (0.3 to 1.0-mi) from the females' den complex (Reinert and Zappalorti 1988; Reed et al. 2012; Zappalorti pers. obs. 1977-2018).

However, in 2006, one radio-tracked female was documented giving birth nearly 6.44-km (nearly 4-mi) from her den (Emile DeVito, NJ Conservation Foundation 2006).

Reinert and Zappalorti (1988) calculated the mean activity ranges for Pine Barrens' timber rattlesnakes using a 95% isopleth, reporting ranges of 207.43-ha for males, 41.58-ha for nongravid females, and 22.19-ha for gravid females. However, these snakes were tracked approximately every five days, potentially missing/excluding movements that may have demonstrated larger activity ranges. Significantly larger ranges were documented for most of the adult males reported by Laidig and Golden (2004), NJ Conservation Foundation (2011), and Smith et al. (2008) ranging from 346.3-ha to 1,172.5-ha, with three adult male's activity ranges being smaller than Reinert and Zappalorti's (1988) average at 45.2-ha and 127.9-ha (Smith et al. 2008) and 58.4-ha (Laidig and Golden 2004). Similarly, the average activity range of three gravid rattlesnakes (tracked for only partial seasons) was calculated to be 94.1-ha with one of the gravid females having an activity range of 260.24-ha (NJ Conservation Foundation 2006, 2007, 2013). A radio-tracked nongravid female tracked for only a partial season had an activity range of 450.45-ha (NJ Conservation Foundation 2006). Bushar et al. (2015) determined that Pine Barrens timber rattlesnakes could potentially move more than 20-km from their den colonies if barriers (e.g., high volume roadways, fragmentations in the continuity of suitable habitats, etc.) are removed. All of these findings demonstrate the extent of variability of the activity ranges and movements of rattlesnakes within the Pine Barrens.

This high degree of variability of the Pine Barrens' rattlesnake movements make it difficult to confidently identify the minimum area used by the majority of rattlesnakes from any documented den/den complex during their active season. For the purpose of this assessment, minimum convex polygon home range data (Row and Blouin-Demers 2006) for timber rattlesnakes from available literature and the ENSP's research was reviewed. In general, only data for documented adult rattlesnakes was used.

Given the hibernaculum/den is the center of a den population's activities and males have larger activity ranges than nongravid and gravid females (Reinert and Zappalorti 1988) and therefore, would better represent the habitat used by the den population, only activity data for adult males was used to create an appropriate buffer for den-associated observations. The mean activity range of 10 adult males from three three sources (Laidig and Golden 2004, Smith et al. 2008, NJ Conservation Foundation 2010, 2011) was 457.46-ha. To determine a potential buffer, this activity range estimate was converted into an estimate of square meters and assumed to be circular in configuration. The buffer distance (radius of the circular activity range) was then calculated resulting in a radius of 1,206.7-meters (1.2-km). However, this buffer greatly underrepresents this species' movements as all ten snakes had ranges lengths exceeding 2.3-km with four out of ten of these snakes' range lengths exceeding 5.0-km, one of which exceed 10.0-km (Laidig and Golden 2004, Smith et al. 2008, NJ Conservation Foundation 2010, 2011). As such, in an effort to more accurately reflect the habitat used by a den population, this assessment takes a similar approach as the montane rattlesnakes and relies on range lengths to develop an appropriate buffer for the feature labels "Hibernaculum (South)" and "Occurrence by Den (South)." The average documented range lengths for the same ten adult males (Laidig and Golden 2004, Smith et al. 2008, NJ Conservation Foundation 2010, 2011), two of which were tracked for only partial seasons and therefore, the data may underrepresent the males' actual movements and land use, resulted in a buffer of 4.7-km.

Using the same approach, the mean activity range of five gravid females (94.1-ha), three of which were only tracked for partial seasons and therefore, the data may underrepresent the females' actual movements and land use, resulted in a radius buffer of 0.55-km; while range lengths ranged from 0.66 to 5.12-km (Reinert and Zappalorti 1988, NJ Conservation Foundation 2006, 2007, 2013). As previously described, gestation and birthing site distances from the female's den are highly variable, usually 0.5 to 1.6-km (Reinert and Zappalorti 1988; Zappalorti pers. obs. 1977-2018), but could be significantly further (Emile DeVito, NJ Conservation Foundation 2006). In an effort to more accurately and reasonably reflect a gestating female's activity range and attempt to include her den or habitat proximate to her den within the buffer, the average range length for five gravid females from two sources (Reinert and Zappalorti 1988, NJ Conservation Foundation 2006, 2007, 2013) was calculated resulting in a radius buffer of 1.4-km for the feature label ("Gestation Site (South)").

"Occupied Habitat (South)" and "On Road (South)" refers to random sightings of rattlesnakes whereby it is impossible to confirm the snake's den location, activity range, and most often, the direction from which the snake originated (i.e., an early or late season observation proximate to suitable den habitat would indicate the likely origination of the snakes while observations at unsuitable den habitat or made at any other time would be impossible to confidently identify its origination). For the purpose of creating a reasonable buffer that could be applied to such "random" timber rattlesnake observations to more accurately approximate habitat use by the local population, only male activity ranges have been reviewed and used to create a buffer for these feature labels as males have larger activity ranges than females (Reinert and Zappalorti 1988). The mean activity range estimate (457.46-hectares) was converted into an estimate of square meters and assumed to be circular in configuration. Buffer distance (radius of the circular activity range) was then calculated resulting in a radius of 1,206.7-meters (rounded to 1.2-km) to be applied to these feature labels.

Since activity ranges for this species are irregular in shape and somewhat oblong (Reinert and Zappalorti 1988, Laidig and Golden 2004, Smith et. al 2008) rather than circular, it is likely these buffers underestimate the habitat used by this species.

"Telemetry: Home Range" and "Telemetry: Partial Activity Range" refers to observation locations collected through radio-telemetry studies; "home range" referring to snakes whereby a full season of data was collected, "partial activity range" referring to snakes whereby only part of the snake's active season was recorded. When such telemetry data has been submitted as an activity range (i.e., a polygon) and includes a complete season of data (i.e., egress through ingress), the polygon will not receive a buffer as the activity range naturally includes the snake's movements within the area during a specified timeframe. Conversely, polygons (i.e., activity ranges) associated with telemetry that include only a partial season of data will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory more accurately for that individual snake. In addition, telemetry data received as relocation points will be entered as a continuous line of movement that will be given the same buffer as randomly observed points ("Occupied Habitat" and "Dead on Road") in an effort to represent the home range territory of the snakes more accurately. By buffering the line of activity, the ENSP is attempting to capture most of the habitat used by an individual snake and allow for directional shifting (i.e., a snake's movements from one location to another) and/or annual shifting of snakes tracked through radio-telemetry.

Literature:

Brown, W.S. 1993. Biology, Status, and Management of the Timber Rattlesnake (Crotalus Horridus): A Guide for Conservation (Joseph T. Collins ed.). Museum of Natural History - Dyche Hall, The University of Kansas, Lawrence, Kansas. 78 pp.

-Transient habitat is also used by females during their reproductive years for gestating and birthing.
-A 1.5-mile (2.4-km) radius centered around den would encompass most of the habitat used by snakes from that den. An additional buffer of 1 mile (for a total of 2.5-mile radius, 4.0-km radius) is recommended to protect large males and some nongravid females that venture further and to buffer the habitat used by the greater portion of the individual den population from human activity.

-Mean size home ranges:
  -New Jersey males: 207 ha
  -New Jersey nongravid females: 42 ha
  -New Jersey gravid females: 22 ha

-Mean maximum migratory distance from den:
  -New Jersey males: 4.07 km (2.5 mi)
  -New Jersey nongravid females: 2.05 km (1.3 mi)

-Maximum single migratory distance from den:

-New Jersey males: 7.2 km (4.5 mi)
-New Jersey nongravid females: 3.7 km (2.3 mi)

Bushar, L.M., H.K. Reinert, and L. Gelbert. 1998. Genetic variation and gene flow within and between local populations of the timber rattlesnake, Crotalus horridus. Copeia 1998(2): 411-422.

-Home ranges were not circular.

Endangered and Nongame Species Program (ENSP). 2000. Timber Rattlesnake Telemetry Research 1999-2000. Unpublished data.

-Home ranges were not circular.
-Activity ranges and dispersal distances of adult study males:

Snake ID	MCP (ha)	Year/period tracked	Maximum distance (km) from den
KM02	56.0	14 May 1999 - 19 September 1999	1.1
KM03	94.5	24 May 1999 - 21 September 2000	1.4
KM05	148.3	30 May 1999 - 07 October 2000	1.4
KM06	201.5	02 June 1999 - 05 August 2000	3.0
KM07	153.5	02 July 1999 - 21 September 2000	2.6

Endangered and Nongame Species Program (ENSP). 2006. Timber Rattlesnake Telemetry Research 2003-2005. Unpublished data.

-Home ranges were not circular.
-Activity ranges and dispersal distances of adult study males:

Snake ID	MCP (ha)	Year/period tracked	Maximum distance (km) from den
H18	n/a due to limited tracking August-October 2003	12 August 2003 - 12 August 2004	1.2 (Note, this may not be the maximum distance moved; limited tracking August-October 2003.)
H20	67.81	29 June 2004 - 24 July 2005	1.4
H21	286.52	15 July 2004 - 30 July 2005	3.5
H22	192.22	23 July 2004 - 07 August 2005	2.7
H26	306.69	06 August 2004 - 06 October 2005	3.0
H27	205.64	15 August 2004 - 03 August 2005	2.8
H28	521.51	15 August 2004 - 01 August 2005	4.2

Endangered and Nongame Species Program (ENSP). 2008. Timber Rattlesnake Telemetry Research 2008. Unpublished data.

-Home ranges were not circular.
-Activity ranges and dispersal distances of adult study male:

Snake ID	MCP (ha)	Year/period tracked	Maximum distance (km) from den
CH0803	281.5	July 2008 - May 2009	3.1

Endangered and Nongame Species Program (ENSP). 2018. NJ Biotics Database: Timber Rattlesnake Observation Data. Unpublished data.

-Timber rattlesnake observations on or immediately adjacent to residences.

Laidig, K. and D. Golden. 2004. Assessing timber rattlesnake movement near a residential development and locating new hibernacula in the New Jersey Pinelands. Reviewed Technical Report, Pinelands Commission, 15 Springfield Road, New Lisbon, New Jersey.

-Home ranges were not circular.
-Activity ranges and dispersal distances of adult study snakes:

Snake ID	Sex	Year/period tracked	Convex polygon (ha)	Maximum distance (km) from den
TR8	Male	2002	58.4	2.290
TR9	Male	2002	706.6	5.220
TR9	Male	2003	722.2	4.630
TR10	Male	2002	346.300	3.480
TR10	Male	2003	426.200	3.510
TR4	Female	2002	42.1	1.240

Martin, W.H. 1992. Phenology of the timber rattlesnake (Crotalus horridus) in an unglaciated section of the Appalachian Mountains. Pp. 259-277, In J.A. Campbell and E.D. Brodie, Jr. (eds.). Biology of the Pitvipers. Selva Press, Tyler, Texas.

-Reported of "42 locations where birthing occurred away from the dens, the mean distance was 164m (range, 25-1250m)... two of the site... were located at the overwintering dens,..."

Martin, W.H. 1993. Reproduction of the Timber Rattlesnake (Crotalus Horridus) in the Appalachian Mountains. Journal of Herpetology 27(2):133-143.

-Females spent most of their gestation period...usually located within 500 m (.3 miles) of their overwintering dens.

Michell, K. 2006. Timber Rattlesnake Telemetry Research in NJ and NY 2006. Unpublished data.

-Home range was not circular.
-Activity ranges and dispersal distances of adult study male:

Snake ID	MCP (ha)	Year/period tracked	Maximum distance (km) from den
B1	439.8	16 April 2006 - 09 October 2006	2.7

**NatureServe. 2018. NatureServe Explorer: Population/Occurrence Delineation Report An online encyclopedia of life (web application). Version 7.1. NatureServe, Arlington, VA. Available at:
http://explorer.natureserve.org/servlet/NatureServe?searchName=Crotalus+horridus
[Accessed September 13, 2018.]**

New Jersey Conservation Foundation. 2006. Unpublished data.

-Home ranges were not circular.
-Partial activity ranges and dispersal distances of adult study snakes:

Snake ID	Sex	Year/period tracked	Convex polygon (ha)	Maximum distance (km) from den

Bonnie	Female	10 Aug 2005 - 18 May 2006	450.45	5.12
Pinky	Female	20 July 2005 - 29 April 2006	5.93	0.689

New Jersey Conservation Foundation. 2007. Unpublished data.

-Home ranges were not circular.
-Partial activity range and dispersal distance of adult study snake:

Snake ID	Sex	Year/period tracked	Convex polygon (ha)	Maximum distance (km) from den
Dinah	Female	15 Aug 2006 - 02 Jan 2007	260.24	3.91

New Jersey Conservation Foundation. 2010. Unpublished data.

-Home ranges were not circular.
-Partial activity range and dispersal distance of adult study snake:

Snake ID	Sex	Year/period tracked	Convex polygon (ha)	Maximum distance (km) from den
Serendipity	Male	03 June 2009 - 23 May 2010	260.24	3.91

New Jersey Conservation Foundation. 2011. Unpublished data.

-Home ranges were not circular.
-Partial activity range and dispersal distance of adult study snake:

Snake ID	Sex	Year/period tracked	Convex polygon (ha)	Maximum distance (km) from den
King	Male	31 July 2009 - 28 Aug 2009; 31 July 2010 - 11 April 2011	1,172.55	10.65

New Jersey Conservation Foundation. 2013. Unpublished data.

-Home ranges were not circular.
-Partial activity range and dispersal distance of adult study snake:

Snake ID	Sex	Year/period tracked	Convex polygon (ha)	Maximum distance (km) from den
Hazie	Female	10 Sept 2012 - 26 April 2013	1,172.55	10.65

Reinert, H.K. and R.T. Zappalorti. 1988. Timber rattlesnakes (Crotalus horridus) of the Pine Barrens: Their movement patterns and habitat preference. Copeia 4: 964-978.

-Males have larger activity ranges than gravid and nongravid females.
-“…males moved a greater total distance than gravid females, while non-gravid females were intermediate and did not differ from either group…” but the “groups did not differ in their mean range length…”
-Shows irregular-shaped activity ranges.
-Average activity ranges were calculated using harmonic mean analysis with 95% isopleths for snakes with complete seasons of telemetry data resulting in: 22.19 ha for gravid females; 41.58 ha for non-gravid females; and 207.43 ha for males.
-Tracked approximately every five days.
-Partial activity ranges and dispersal distances of gravid female study snakes:

Snake ID	Sex	Year/period tracked	Convex polygon (ha)	Maximum distance (km) from den
107	Female-gravid	1985	20.4	0.66
108	Female-gravid	1985	13.8	0.84

Row, J.R. and G. Blouin-Demers. 2006. Kernels are not accurate estimators of home-range size for herpetofauna. Copeia 20016(4):797-802.

-Describes the potential problems using kernel home-range estimators versus minimum convex polygon when working with reptiles and amphibians.

Smith, R.M., W.F. Bien, H.W. Avery, and J.R. Spotila. 2008. Coexistence of Rattlesnakes and Military Operations: Occurrence and Spatial Ecology of the Timber Rattlesnake (CRotalus horridus) on the Warren Grove Gunnery Range in the Pinelands of New Jersey. Pp. 317-326, In W.K. Hayes, K.R. Beaman, M.D. Cardwell, and S.P. Bush (eds.). The Biology of Rattlesnakes. Loma Linda University Press, Loma Linda, California.

-Shows irregular-shaped activity ranges.

Last researched by: Schantz

Date researched: 11/18/2018

Reptilia

Wood Turtle
Glyptemys insculpta

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
4866	Not applicable	Nesting Area	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4867	Not applicable	Hibernaculum	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4868	Not applicable	On Road	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4869	Not applicable	Vernal Pool	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
4870	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

A radius of one mile as the starting point for wood turtle habitat mapping was chosen based upon ecological studies that demonstrated wood turtle movements of 800m (Harding and Bloomer), 1km (Mitchell 1991), and 1.9km and 3.6km (Quinn and Tate 1991) along riparian corridors. Carroll and Ehrenfeld (1978) demonstrated that wood turtles displaced up to 2km were well within their home range. In addition to linear movements following watercourses, it is well documented that wood turtles travel beyond the riparian zone during the summer months. The 322m buffer represents a mean distance wood turtles traveled from their hibernation/breeding streams according to various natural history studies (Burt and Collins n.d.; Ernst 1986; Harding and Bloomer 1979; Strang 1983; Kaufmann 1992, 1995; Brewster and Brewster 1991; Farrell and Graham 1991; Quinn and Tate 1991), as well as ongoing research (R.L. Burke, Hofstra University; J.L. Behler, Wildlife Conservation Society).

Literature:

Brewster, K. N., and C. M. Brewster. 1991. Movement and microhabitat use by juvenile wood turtles introduced into a riparian habitat. J. Herpetol. 25:379-382.

N/A

Burt, C.J. and D.E. Collins. Population parameters and summer home range-habitat relationships of the wood turtle (Clemmys insculpta). Unpub. Manuscript. 26pp.

N/A

Carroll, T. E. and D. W. Ehrenfeld. 1978. Intermediate-range homing in the wood turtle, Clemmys insculpta. Copeia 1978(1): 117-126.

N/A

Ernst, C.H. 1986. Environmental temperatures and activities in the wood turtle, Clemmys insculpta. J. of Herp. 20(2):222-229.

N/A

Farrell, R. F. and T. E. Graham. 1991. Ecological notes on the turtle Clemmys insculpta in northwestern New Jersey. J. Herp. 25(1): 1-9.

N/A

Harding, J. H. and T. J. Bloomer. 1979. The wood turtle, Clemmys insculpta...a natural history. HERP Bull. N.Y. Herp. Soc. 15(1): 9-26.

N/A

Kaufmann, J. H. 1992. Habitat use by wood turtles in central Pennsylvania. J. Herpetol. 26:315-321.

N/A

Kaufmann, J. H. 1995. Home ranges and movements of wood turtles, Clemmys insculpta, in central Pennsylvania. Copeia 1995:22-27.

N/A

Mitchell, J. C. 1991. Amphibians and reptiles. Pages 411-76 in K. Terwilliger (coordinator). Virginia's Endangered Species: Proceedings of a Symposium. McDonald and Woodward Publishing Company, Blacksburg, Virginia.

N/A

Quinn, N. W. S., and D. P. Tate. 1991. Seasonal movements and habitat of wood turtles (Clemmys insculpta) in Algonquin Park, Canada. J. Herpetol. 25:217-220.

N/A

Strang, C. A. 1983. Spatial and temporal activity patterns in two terrestrial turtles. J. Herpetol. 17:43-47.

N/A

Last researched by: Zarate

Date researched: 1/1/2007

Reptilia

Woodland Box Turtle

Terrapene carolina carolina

SpcF LID	LUC	Feature Label	Buffer Size	Point Rule	Line Rule	Poly Rule	LP
5094	Not applicable	Occupied Habitat	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5095	Not applicable	Vernal Pool Non-breeding	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5096	Not applicable	Hibernaculum	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5097	Not applicable	Nesting Area	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes
5098	Not applicable	On Road	500 Meter Buffer	Apply a buffer	Convert to a point and buffer	Convert to a point and buffer	Yes

Justification:

The eastern box turtle, Terrapene carolina, is the most terrestrial of New Jersey's turtles. Although the box turtle's home range is usually no greater than 15 hectares, individuals routinely move between populations, especially juveniles. When displaced from their home range, T. carolina is known to have some homing ability outwards to 1.5 kilometers and individuals placed outside of this distance will take up occupancy at the release point with mixed success.

As a special concern species, much of the state data collected on T. carolina is in the form of Herp Atlas reports which are mapped on 1/6 USGS Quadrangles

Literature:

Dodd, C. K., Jr. 2001. North American box turtles: a natural history. University of Oklahoma Press, Norman. 231 pp.

Comprehensive text on box turtle life history.

Dolbeer, R. A. 1969. Population density and home range size of the eastern box turtle (Terrapene c. carolina) in eastern Tennessee. ASB Bulletin 16:49.

Provides home range estimates for a population of box turtles and general habitat requirements.

Ernst, C. H., R. W. Barbour, and J. E. Lovich. 1994. Turtles of the United States and Canada. Smithsonian Institution Press, Washington, D.C. xxxviii + 578 pp.

Literature-based life history of the box turtle.

NatureServe. 2006. NatureServe Explorer: An online encyclopedia of life (web application). Version 4.7. NatureServe, Arlington, VA. Available at: http://www.natureserve.org/explorer.

Inferred minimum extent of habitat use for this species is 500 meters.

Stickel, L. F. 1989. Home range behavior among box turtles (TERRAPENE C. CAROLINA) of a bottomland forest in Maryland. J. Herpetol. 23:40-44.

Describes habitat use by box turtles and home range sizes. Movements to nesting areas, which are critical to the viability of a population are often not calculated in an individual's home range.

Last researched by: Zarate

Date researched: 1/1/2006