INVESTIGATIONS AND MANAGEMENT OF NEW JERSEY'S FRESHWATER FISHERIES RESOURCES 2015

State of New Jersey
Division of Fish and Wildlife
Bureau of Freshwater Fisheries

NEW JERSEY DIVISION OF
Fish and Wildlife

INVESTIGATIONS AND MANAGEMENT OF NEW JERSEY'S FRESHWATER FISHERIES RESOURCES 2015

Including
Sport Fish Restoration Grant F-48-R

Job Performance Reports Segment 26 (2nd Extension)
(November 1, 2014 – October 31, 2015)

and

Final Reports

February 2016

New Jersey Department of Environmental Protection
Division of Fish and Wildlife
Bureau of Freshwater Fisheries

This grant was paid for by fishing license sales and matching Dingell-Johnson/Wallop-Breaux funds available through the Federal Sportfish Restoration Act.

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New Jersey's Freshwater Research and Management activities are funded entirely by New Jersey's licensed anglers. These activities benefit the state's 8 million residents by protecting and assessing New Jersey's vital freshwater resources.

Clean water for fish means clean water for us and generations to come

TABLE OF CONTENTS

INTRODUCTION

Highlights for 2015

The Bureau of Freshwater Fisheries conducted 243 surveys throughout the state in 2015, to address a variety of recreational and resource management needs, including response to emerging fisheries issues (page 11). A total of 225 surveys were conducted at 127 waterbodies in which fish were collected, with over 59,000 fish representing 73 species identified and enumerated by state fisheries biologists. Of the 127 waterbodies, 71 were streams/rivers, while 56 were ponds/lakes. Surveys were conducted to satisfy a wide variety of projects, ranging from electrofishing surveys at 27 lakes to evaluate Largemouth Bass populations to the assessment of 47 streams as candidates for Wild Trout Stream regulations. Coolwater fisheries assessments were conducted at 8 lakes, while an inventory was conducted at Union Lake. Most surveys are used to monitor populations, assess stocking programs, map the distribution of rare native fishes, document or control populations of invasive fishes/aquatic plants. This report documents the ongoing fisheries management activities across New Jersey performed by the Division of Fish and Wildlife (NJDFW) and the status of its fisheries resources in 2015.

Of the 225 fisheries surveys conducted in 2015, 81 were standardized stream electrofishing surveys. These surveys contribute valuable data used for multiple projects and fisheries management functions, including the classification of New Jersey's surface waters within the Department's Surface Water Quality Standards N.J.A.C. 7:9B (page 95). This system is the regulatory cornerstone that helps protect our critical watersheds. These assessments use important stream health indicators such as Brook, Brown, and Rainbow Trout to identify high water quality and critical habitat areas. Thirteen surveys produced results that warrant upgrades to current classifications, 12 of which are recommendations to *Trout Production*. Fifty-two surveys conducted confirmed existing stream classifications.

NJDFW has documented reproducing trout populations in nearly 200 streams (or stream segments) statewide, but only a handful of these (36) are currently designated as *Wild Trout Streams*. These 36 streams are not stocked with hatchery trout, but rather rely upon the wild, naturally reproducing trout populations inhabiting these streams to provide a recreational fishery. The *Wild Trout Stream* regulation, which is more stringent than the statewide general trout regulation, has changed little since it was adopted in 1990. In 2014, the Bureau of Freshwater Fisheries conducted 46 electrofishing surveys on sections of all 36 designated *Wild Trout Streams*, yielding 3,137 trout, with a mean of 68 trout per survey. Data collection efforts continued in 2015 and an additional 47 surveys were conducted on 38 streams (page 47). The data collected on the *Wild Trout Streams*, as well as data from other streams having naturally reproducing trout populations, will be further analyzed to evaluate the current *Wild Trout Stream* regulation and determine if changes are warranted.

In September of 2013, furunculosis, a disease primarily affecting cold water species of fish such as trout, was discovered affecting the trout in the raceways at NJDFW's Pequest Trout Hatchery for the first time in the hatchery's 31 year history. Although the disease resulted in significant changes to NJDFW's 2014 Spring Trout Stocking Program, the 2015 season was back on track as the spring baseline of 570,000 trout and the 25,000 trout were stocked in the fall and winter (page 41). In order to minimize future impacts, NJDFW is currently raising all Rainbow Trout,

as they were less vulnerable to succumbing to the bacterial disease than the Hatchery's Brook and Brown Trout.

The effort put forth conducting various research and management activities enables the Bureau to monitor fish heath across the state. Trout and warmwater fish species encountered were carefully inspected for visible lesions and symptomatic fish were submitted to NJDFW's Fish Pathologist for further inspection and/or testing. No evidence of furunculosis or any other significant pathogens were found during the 2015 field season.

In 2015, the Bureau's stream temperature monitoring program was expanded to 39 thermographs (instruments that continuously monitor temperature), deployed on 17 recreationally important trout streams (page 37) and 14 small streams having reproducing trout populations (page 40). Both water and air temperatures are recorded in wild Brook Trout streams as part of an Eastern Brook Trout Joint Venture initiative to assess climate change. The temperature data will be used to assess current habitat conditions, evaluate long term trends, determine if ambient water quality is consistent with surface water quality standards, and aid in the management of coldwater fisheries, including evaluation of stocking practices and fishing regulations.

This year also marked the third year of the Coolwater Fisheries Assessment (page 53). This multi-year project will evaluate trophy coolwater fisheries for Muskellunge, Northern Pike, Walleye, and Hybrid Striped Bass. These fisheries are primarily maintained by annual stockings of fish reared at NJDFW's Hackettstown State Fish Hatchery. In 2015 seven waterbodies were selected for trap netting surveys (Canistear Reservoir, Furnace Lake, Manasquan Reservoir, Mercer Lake, Monksville Reservoir, Spruce Run Reservoir, and Swartswood Lake). Target species included Muskies, Northern Pike, Walleye, and Hybrid Striped Bass. A total of 73 trap nets, 9 overnight gill net sets, and 5 nights of boat electrofishing were utilized to capture the target species of interest from each waterbody. Furnace, Monksville, Spruce Run, and Swartswood, produced the highest numbers of target species, while additional data are necessary to assess the status of the fisheries at Canistear, Manasquan, and Mercer.

Union Lake, the largest lake in southern New Jersey at 898 acres, was the subject of an extensive sampling and data analysis effort spanning 2015 (11 field days). Fish capture techniques utilized include boat electrofishing, seining, and gill netting. The product of this endeavor is a report that will guide a balanced management strategy for the lake's fisheries resource. Union Lake has one the highest species diversities in the state. Twenty-five species, representing thirteen families and ten orders were collected during the 2015 sampling at this lake. Many of the species have been introduced for recreational purposes, however, a few of New Jersey's rarer native species (i.e. Bluespotted Sunfish, Pirate Perch, and Swamp Darter) also inhabit these waters. The most abundant species collected during seining was Largemouth Bass, representing 22% of the total catch. Largemouth Bass were also the most abundant game species collected during electrofishing. Panfish (Bluegill, Yellow Perch, and White Perch) were found in similar abundance during electrofishing surveys. Complete results of the inventory can be found in Appendix I (Union Lake Fisheries Management Plan).

Largemouth Bass are the most popular and widely distributed of the state's game species. New Jersey has over 400 impoundments open to the general public for fishing and thousands more in private ownership scattered throughout the state. These lentic environments offer excellent fishing opportunities for a variety of species such as bass, sunfish, crappie, and pickerel. These

species naturally reproduce in these waterways and often do not require active stocking to sustain their populations. The Bureau of Freshwater Fisheries conducted electrofishing surveys at 27 lakes and ponds throughout the state to assess the status of their fisheries (page 62). Crews also collected fish with a 20 ft. seine to assess the reproductive success of warmwater species at 21 lakes and ponds (page 71). These data are used to determine if supplemental stockings are necessary.

Significant progress was made this year in the assessment and protection of our state's native fishes (page 80). A formal review process led by the NJDFW's Endangered and Nongame Species Program was conducted in 2014 and 2015 to determine the status of our native freshwater fishes, known as the Delphi Technique. This is a systematic method for reaching consensus among experts by incorporating all available data and disseminating those data among all participants. Results will be used to support the listing of state Endangered, Threatened, and Special Concern, as well as identifying species that are considered to be stable and secure. The Delphi will assist NJDFW's efforts towards updating New Jersey's State Wildlife Action Plan. (Hunter and Angler Fund)

The Bureau of Freshwater Fisheries participated in the ten-year revision of the State Wildlife Action Plan (SWAP). The SWAP is a strategic and cost-effective mechanism to preserve the state's wildlife resources for the future. Recovery of species that have reached threatened or endangered status is typically more costly than preventative actions that keep species populations from reaching such declines. Proactive management actions identified in the SWAP are intended to keep species from becoming federally (and state) threatened and endangered. NJDFW is currently updating the New Jersey's Wildlife Action Plan (2005) as required by Congress to continue to receive federal Wildlife Grants. More importantly, New Jersey's update will serve as a blueprint for conserving our wildlife heritage. The plan will identify priority actions addressing known threats facing our targeted species and habitats that we, as a conservation community, can implement in the next ten years.

In 2012, eleven freshwater coastal lakes suffered the wrath of Hurricane Sandy, as record setting high tides inundated these freshwater systems with saltwater, sediment and debris, often resulting in mortality of freshwater fish. By 2014, with the exception of Hooks Creek Lake, all were found to have recovered from Hurricane Sandy and were stocked with warmwater fish. The salinity of Hooks Creek Lake in Cheesequake State Park finally returned to suitable levels to stock freshwater fish in the fall of 2015, as it gradually decreased from 11.8 ppt in January of 2013 to 1.12 ppt. in August of 2015. Although the effects of Hurricane Sandy will have lasting impacts on many residents of New Jersey for many years to come, the current status of eleven of the twelve freshwater lakes impacted by this extreme weather event (all but Lake Takanassee) are on there way to a full recovery, as salinity levels have returned to suitable levels to support freshwater fish populations (page 53).

In addition to these highlights, this report describes a host of other field work and activities conducted by the Bureau of Freshwater Fisheries. The efforts of full-time Bureau personnel are complemented by a dedicated and talented seasonal staff, who provide incredible insight, enthusiasm, and the labor which is vital to raising fish, conducting fisheries surveys statewide, and performing countless tasks that help maintain and enhance New Jersey's freshwater fisheries

resources. The Bureau's work is made possibly by both the dedicated monies of the Hunter and Anglers Fund and the Sport Fish Restoration Program.

Bureau of Freshwater Fisheries

The mission of the Bureau of Freshwater Fisheries (BFF) is to protect and manage the state's freshwater fish resources to maximize their long-term biological, recreational, and economic value for all New Jerseyans. Our goals are:

1) To maintain New Jersey's rich variety of freshwater fish species at stable, healthy levels and enhance the many habitats on which they depend;

2) To educate New Jersey residents on the values and needs of our freshwater fish resources and to foster a positive human/wildlife co-existence;

3) To maximize the recreational and commercial use of New Jersey's freshwater fishes for both present and future generations.

In 2014 freshwater fish culture and maintenance operations (Fish Culture Unit) were removed from the Bureau of Freshwater Fisheries. This is the first time since the early days of NJDFW that fish culture operations were separated from the protection and management of the state's fisheries resources. The Fish Culture Unit was further split into three separate entities; Pequest Trout Hatchery; Hackettstown State Fish Hatchery; and the Maintenance Unit. The reorganization resulted in only research and management operations remaining within the Bureau of Freshwater Fisheries.

The Bureau of Freshwater Fisheries has personnel in two regionally placed offices: Lebanon Field Office (Hunterdon) and the Central Regional Office (Monmouth). The Bureau oversees the management and protection of the state's over 27,000 miles of streams and over 400 public lakes. The biologists also carry out a number of freshwater projects each year.

The Bureau conducts fishery surveys, classifies the state's waterways, provides technical input on a variety of watershed and habitat based issues, facilitates habitat restoration projects, serves as liaisons to a variety of sportsmen groups, and provides information to the general public in a variety of forums concerning the status of the state's fishery resources. The Bureau of Freshwater Fisheries also administers permits for fish stocking, water lowering, commercial baitfish, and scientific collecting to further provide for the effective management and protection of the state's aquatic resources.

The Bureau of Freshwater Fisheries works closely with NJDFW's fish pathologist, Dr. Jan Lovy, within the Office of Fish and Wildlife Health and Forensics. The fish pathology laboratory is located at the Pequest Trout Hatchery outside Oxford, NJ, and close to the Hackettstown State Fish Hatchery. Dr. Lovy conducts disease monitoring and research in wild and hatchery-raised fish populations throughout the state. For disease diagnostics staff works with the NJ Animal Health Diagnostic Laboratory (NJ AHDL). The AHDL is a state-of-the-art facility equipped with molecular biology suites, a virology laboratory with cell culture facilities maintaining fish cell lines, and modern bacterial diagnostic equipment. The AHDL also provides diagnostic services in fish health for private fish hatcheries.

The Bureau currently has six fisheries biologists on staff. The primary delineation of responsibilities is based on regional watershed management areas. The state is divided into six regional watershed management areas (Figure 1), but due to staffing shortages vacant management regions have been subdivided and reassigned to remaining biologists. In addition to regional responsibilities assigned to most of the biologists, each has a specific area of expertise and oversees related research and management programs:

Mark Boriek – Principal Fisheries Biologist
Fisheries Management in the Lower Passaic Region (Lower Passaic, Hackensack, Hudson), and Rahway River and Upper Atlantic Watersheds, and Anadromous Fishes Management

Scott Collenburg – Assistant Fisheries Biologist
Fisheries Management in the Upper Passaic Watershed, Coolwater Fisheries Assessment, Stream Temperature Monitoring, Opening Day Angler Surveys, and Wild Trout Stream Team

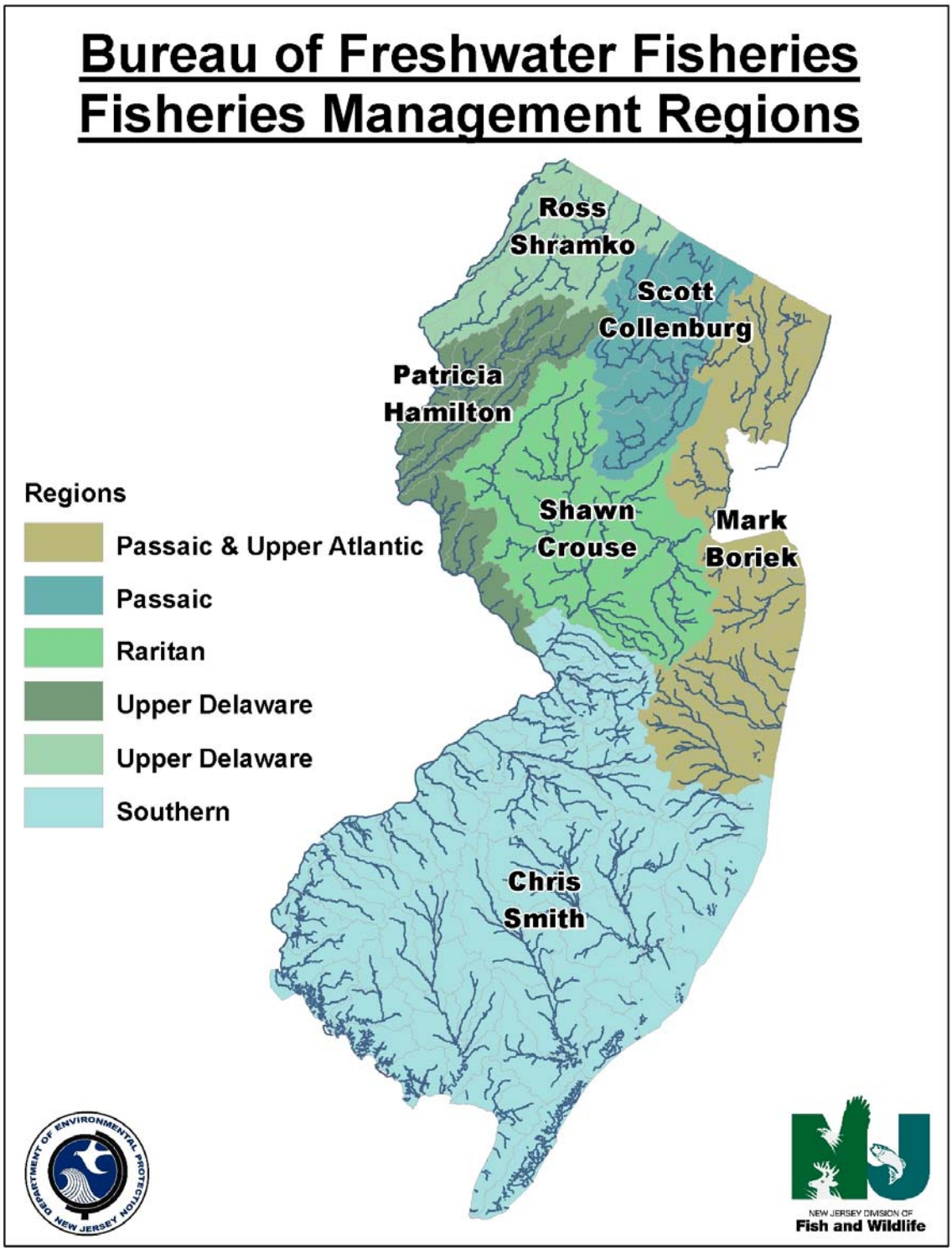
Shawn Crouse – Principal Fisheries Biologist
Fisheries Management in the Raritan Region
and Native Fishes Management including State Wildlife Action Plan

Pat Hamilton – Principal Fisheries Biologist
Fisheries Management in the Upper Delaware (South) Region,
Coldwater Fishes Management, Wild Trout Stream Team, and Federal Grant Coordinator

Ross Shramko – Senior Fisheries Biologist
Fisheries Management in the Upper Delaware (North) Region and Wallkill River Watersheds, Trout Stocking Coordinator, GIS, Database Management, Wild Trout Stream Team, and Angler Surveys

Chris Smith – Principal Fisheries Biologist
Fisheries Management in the Southern Region (Lower Delaware & Lower Atlantic Coastal Watersheds), Warmwater Management, and Invasive Species

FIGURE 1. NJDFW, Bureau of Freshwater Fisheries – 2015 Fisheries Management Regions.



Funding

NJDFW's Bureau of Freshwater Fisheries is funded entirely by New Jersey sportsmen, through the sale of fishing licenses and through a Federal excise tax on the manufacturing of hunting and fishing related equipment. This "user-pays" system has made great strides in financing the management of New Jersey's fish and wildlife resources, not only to the benefit of licensed hunters and anglers but to every one of the state's over 8 million residents. Wildlife associated recreation also generates $2.2 billion dollars into the state's economy each year, with an estimated 300,000 freshwater anglers generating $138 million dollars alone. The two funding sources are described below and after each activity described later in this report the funding source is indicated as either Hunter and Angler Fund or Federal Grant F-48-R (with Project Number I, II, or III specified).

Hunter and Angler Fund - Licenses, Stamps, and Permits

The sale of freshwater fishing licenses and trout stamps generates over $3.5 million dollars to NJDFW each year. Of this, 1 million is allocated to the Bureau of Freshwater Fisheries to support the state's freshwater research and management efforts. The remaining funds are used to fund other activities within NJDFW such as Fish Culture operations, Information and Education, Lands Management, and Law Enforcement, as well as Administrative staff.

Sport Fish Restoration Program

Federal excise tax money is distributed through the Sport Fish Restoration Fund administered by the United States Fish and Wildlife Service (USFWS). The Sport Fish Restoration Program, established by an amendment to the Dingell-Johnson Act of 1950, provides funding for the management, conservation and restoration of fishery resources. The Sport Fish Restoration Program is funded by revenues collected by the manufacturers of fishing rods, reels, creels, and lures, who pay an excise tax on these items to the U.S. Treasury. The program is a cost-reimbursement program, where the state covers the full amount of the approved project then applies for reimbursement for up to 75% of project expenses.

For the one-year grant cycle, November 1, 2014 – October 31, 2015, the Bureau received $244,444 from the Sport Fish Restoration Program for fisheries research and management activities conducted under Grant F-48-R, Investigations and Management of New Jersey's Freshwater Fisheries Resources. Grant F-48-R is comprised of three projects that focus on (1) assessing and managing fisheries, (2) restoring fisheries and their aquatic habitats, and (3) managing the recreational use of fisheries. The grant's three projects, project objectives, and activities conducted under each project during 2015 are listed below.

Federal Grant F-48-R

Project I: Assessment of the Biological Integrity of Inland Fisheries

Objective: To assess the biological integrity New Jersey's aquatic resources through the collection of physical, chemical, and biological data and use this information to develop, implement, and evaluate management and stocking strategies to improve and enhance sport fishing.

Activities:
1. Anadromous Fisheries Assessment
2. Coolwater Fisheries Assessment
3. Database Management – *FishTrack*
4. Inventory of *Trout Production* Streams
5. Lake Inventory – Union Lake Fisheries Management Plan
6. Lake Trout Population Assessment
7. Special Regulation Trout Area Assessment
8. Stream and Lake Assessments for Surface Water Classification
9. Temperature Monitoring – Streams
10. Wild Brook Trout Assessment
11. Wild Trout Stream Regulation Assessment

Project II: Protection and Restoration of Inland Fisheries and Aquatic Habitats

Objective: To protect, maintain, and restore healthy fisheries and their aquatic habitats in New Jersey's inland waters.

Activities:
1. Aquatic Invasive Fishes and Plants Management
2. Conservation and Restoration of Fish Habitat
3. Wild Fish Population Health Assessment

Project III: Management of Recreational Fisheries Users

Objective: To obtain and use pertinent information on freshwater angler attitudes, preferences, participation, and resource utilization to protect, manage, and enhance sport fisheries.

Activities:
1. Opening Day Trout Angler Survey
2. Trout Angler Logbook Program
3. Warmwater Angler Survey

The Bureau of Freshwater Fisheries conducted 243 surveys throughout the state in 2015. The map below demonstrates the survey quantity, geographic distribution, and type (Figure 2). 225 surveys were conducted at 127 waterbodies in which fish were collected, most of which include the determination of basic water quality parameters such as dissolved oxygen, temperature, pH, etc. An additional 18 locations were water quality surveys only. A complete list of field locations surveyed in 2015 is found in Table 1, following the map. Surveys were conducted under two funding sources, either Hunter and Angler Fund or Federal Grant F-48-R.

FIGURE 2. Field sites sampled in 2015 by NJDFW, Bureau of Freshwater Fisheries.

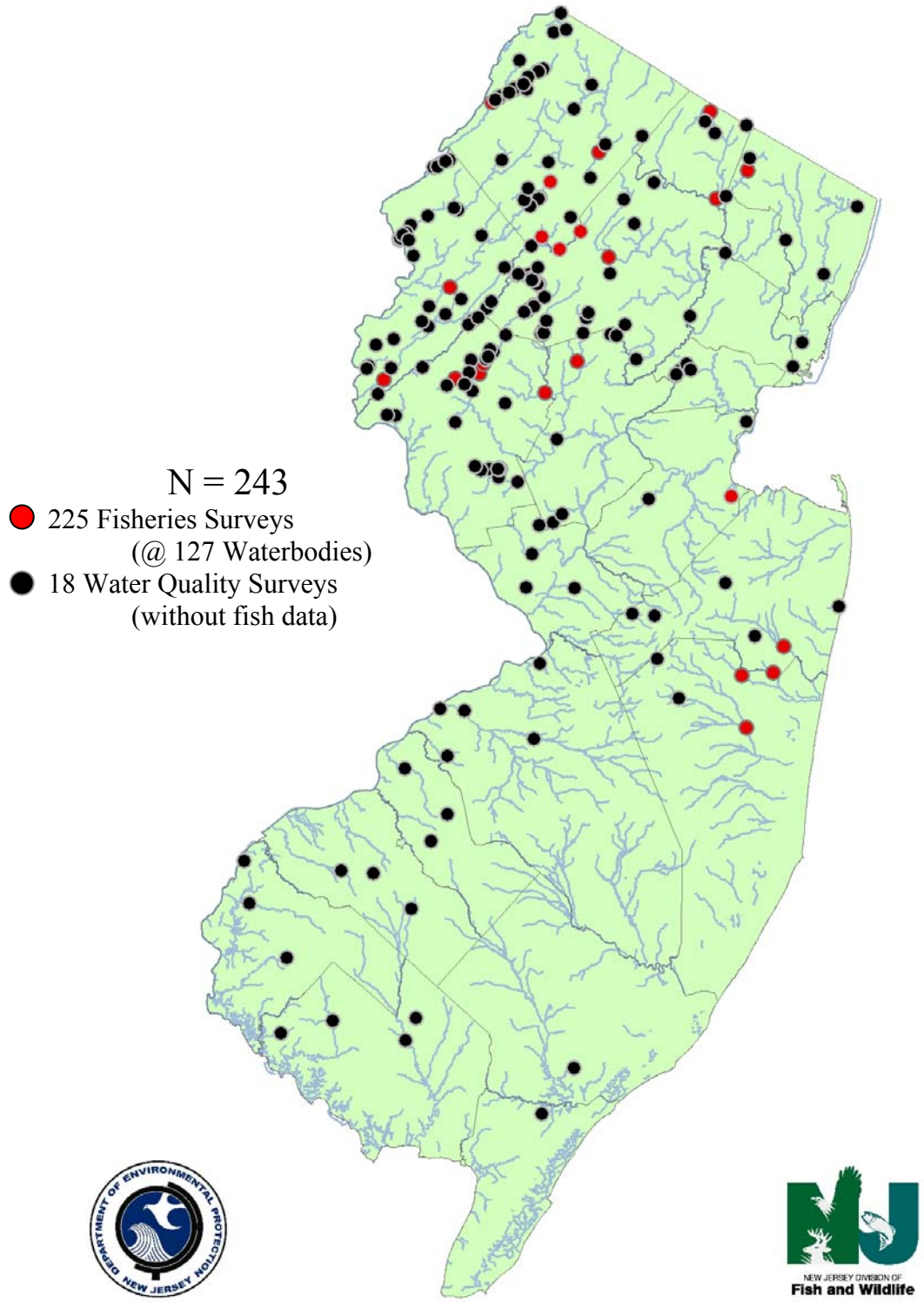


TABLE 1. 2015 field sampling locations

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Southern Region (Lower Delaware River and Lower Atlantic Coastal)																
Alcyon Lake											●				NA	62
Alloway Lake												●	▲		NA	71
Amico Island Pond												●	▲		NA	71
Cooper River Park Lake							▲				●				NA	64, 87, 89
Crystal Lake												●	▲		NA	71
Davis Millpond											●				NA	65
Delaware River							▲				●				NA	65, 87
DOD Lake							▲				●				NA	65, 87, 89
Egg Harbor Township Preserve Pond												●	▲		NA	72
Hilliards Creek							●								NA	87
Masons Run – upstream Mansions Apt Complex	▲		▲											●	✓	43, A2
Masons Run – downstream of Branc Road	▲		▲											●	✓	43, A3
Mullica Hill Pond											●				NA	67
Olympia Lakes Pond #1												●	▲		NA	73
Olympia Lakes Pond #2												●	▲		NA	73

TABLE 1. 2015 field sampling locations (continued)

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Southern Region (Lower Delaware River and Lower Atlantic Coastal) (continued)																
Prospertown Lake											●				NA	68
Salem Canal											●				NA	68
Silver Lake							●								NA	87, 88
Smithville Lake												●	▲		NA	74
South Vineland Park Pond	●										●				NA	69, 107, B4
Strawbridge Lake												▲	●		NA	74, 83
Sunset Lake (Cumberland)											●				NA	70
Tuckahoe Pond												▲	●		NA	75, 83
Union Lake										●		▲	▲		NA	61, AI
Wilson Lake												●	▲		NA	75

TABLE 1. 2015 field sampling locations (continued)

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Upper Delaware Region (Upper Delaware & Wallkill)																
Assunpink Lake										▲	●				NA	62, 93
Bear Creek	▲	●	▲										▲		✓	43, 47, A4
Bear Pond												▲	●		NA	71, 83
Beattys Brook	▲	●	▲										▲		✓	43, 47, A5
Beerskill Creek	▲	▲	▲	■									▲		✓	40, 43, 47, A6
Big Flat Brook – between Route 206 & Route 560	▲		▲	■	●								▲		✓	43, 37, A7
Big Flat Brook – downstream of Route 560	▲		▲		●								▲		✓	43, A8
Big Flat Brook – upstream of Blewitt Tract	▲		▲	■	●								▲		✓	43, 37, A9
Bowers Brook	▲	●	▲										▲		✓	43, 47, A10
Brass Castle Brook – Harmony Brass Castle Road	▲	●	▲										▲		✓	43, 47, A11
Brass Castle Brook – Kayharts Lane	▲	●	▲										▲		✓	43, 47, A12
Clove Acres Lake											●				NA	63
Columbia Lake									●		▲				NA	64, 77
Criss Brook	▲	●	▲										▲		✓	43, 47, A13
Delaware Lake											●				NA	65

TABLE 1. 2015 field sampling locations (continued)

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Upper Delaware Region (Upper Delaware & Wallkill) (continued)																
Flat Brook – Three Bridges	▲		▲		●								▲		✓	43, A14
Flat Brook – Roy Bridge				■											NA	37
Forked Brook	▲	▲	▲	■									▲		✓	40,43,47,A15
Franklin Pond Creek	▲		▲							●			▲		✓	32,43,47, A16
Furnace Lake						●									NA	55
Hakihokake Creek (trib.)(Wydner)	▲	●	▲										▲		✓	43, 47, A17
Hance's Brook	▲	●	▲										▲		✓	43, 47, A18
Hyper Humus Ponds							▲					●	▲		NA	72, 91
Iliff Lake	▲			●											NA	107, B2
Knowlton Brook	▲		▲							●			▲		✓	32, 43, A19
Kymer Brook – below Gardners Pond													●			43, 83, A20
Kymer Brook – Route 206													●			43, 83, A21
Kymer Brook – Brighton Road													●			43, 83, A22

TABLE 1. 2015 field sampling locations (continued)

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Upper Delaware Region (Upper Delaware & Wallkill) (continued)																
Lake Musconetcong				●				●							NA	93
Lopatcong Creek – Rt. 519 Warren Co. Fairground	▲	●	▲										▲		✓	43, 47, A23
Lopatcong Creek – Lock Street	▲	●	▲										▲		✓	43, 47, A24
Lopatcong Creek – South Main Street	▲	●	▲										▲		✓	43, 47, A25
Mercer Lake						●					●				NA	56
Merrill Creek Reservoir	▲										●			●	NA	35, 67, 96
Mill (Clove) Bk (Sussex–Mont.) – Rt. 23	▲	●	▲										▲		✓	43, 47, A26
Mill (Clove) Bk (Sussex–Mont.)- off Mashipacong	▲	●	▲										▲		✓	43, 47, A27
Mine Brook (Morris) – Mine Hill Road	▲		▲							●					✓	43, 47, A28
Mine Brook (Morris) –Drakestown Road, upstream	▲	●	▲										▲		✓	43, A29
Musconetcong River – upstream of Pt. Mtn. Rd.	▲		▲		▲					●			▲		✓	43, 52, A30
Musconetcong River – downstream of Pt. Mtn. Rd.	▲		▲		▲					●			▲		✓	43, 52, A31
Musconetcong River – Route 519			▲							●			▲		NA	43, A32
Papakating Creek	▲		▲										●		✓	43, 83, A33
Parker Brook	▲	●	▲										▲		✓	43, 47, A34

TABLE 1. 2015 field sampling locations (continued)

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Upper Delaware Region (Upper Delaware & Wallkill) (continued)																
Paulins Kill – Crisman Road			▲						●				▲			43, 77, A35
Paulins Kill – Sunset Hill Road			▲						●				▲			43, 77, A36
Paulins Kill – Vail Road and Sipley Road			▲	■					●				▲			37,43,77,A37
Paulins Kill – Station Road			▲	■					●				▲			37,43,77,A38
Paulins Kill – Warrington Road									●							43, 77, A39
Paulins Kill – Below Columbia Lake Dam				■					●				▲			37, 77
Paulins Kill – Route 46 Bridge			▲						●				▲			43,77,A40,A41
Pequest River				■											NA	37
Pequest River (trib.) (Green Twp)			▲										●			43, 83, A42
Pequest River (trib.) (Readings Pond)			▲										●			43, 83, A43
Pohatcong Creek – Valley Road	●		▲										▲		✓	43, 97, A44
Pohatcong Creek – Route 31	●		▲										▲		✓	43, 97, A45
Pohatcong Creek – Route 637	●		▲										▲		✓	43, 97, A46
Pohatcong Creek – Ravine Road near Route 173				■											NA	37
Rising Sun Lake											●				NA	68
Shabakunk Creek	▲		▲										●		✓	43, 83, A47
Sparta Glen Brook	▲		▲							●			▲		✓	43, 51, A48

TABLE 1. 2015 field sampling locations

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Upper Delaware Region (Upper Delaware & Wallkill) (continued)																
Spring Mills Brook	▲	●	▲										▲		✓	43, 47, A49
Steenykill Lake											●	▲	●		NA	69, 74, 83
Stephensburg Brook	▲	▲	▲	■									▲		✓	40,43,47,A50
Stony Brook (Sussex) – Kittle Rd. and Coursen Rd.	▲	●	▲										▲		✓	43, 47, A51
Stony Brook (Sussex) – Kittle Road	▲	●	▲										▲		✓	43, 47, A52
Swartswood Lake						●									NA	57
Tilcon Lake	▲			●							●				NA	36,70,107,B3
Van Campens Brook – Millbrook Road	▲	●	▲										▲		✓	43, 47, A53
Van Campens Brook – Watergate Park	▲	●	▲										▲		✓	43, 47, A54
Van Campens Brook – Van Campens Glen	▲	●	▲										▲		✓	43, 47, A55
Van Campens Brook – Depew Recreation Area	▲	●	▲										▲		✓	43, 47, A56
Wallkill River				■											NA	37
West Portal Creek	▲		▲							●					✓	43, 52, A57

TABLE 1. 2015 field sampling locations (continued)

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Passaic Region (Passaic, Hackensack, & Hudson) and Upper Atlantic																
Bear Swamp Brook	▲	●	▲										▲		✓	43, 47, A58
Black Brook (Morris)	▲		▲										●		✓	83, A59
Canistear Reservoir						●									NA	55
Deal Lake											●				NA	53, 64
Green Turtle Pond											●				NA	66
Hibernia Bk (trib.)(Lk Ames)	▲	●	▲										▲		✓	43, 47, A60
Indian Grove Brook	▲	●	▲										▲		✓	43, 47, A61
Indian Lake												●	▲		NA	54, 72
Lincoln Park Pond												●	▲		NA	73
Manasquan Reservoir						●					●				NA	56, 66
Manasquan River				■											NA	37
Metedeconk River, N/Br				■											NA	37
Metedeconk River, S/Br				■											NA	37
Mill Bk (Morris)	▲	●	▲										▲		✓	43, 47, A62
Monksville Reservoir						●									NA	56

TABLE 1. 2015 field sampling locations (continued)

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Passaic Region (Passaic, Hackensack, & Hudson) and Upper Atlantic (continued)																
Passaic River – Hardscrabble Road	▲	●	▲										▲		✓	43, 47, A63
Passaic River – Columbia Turnpike (Route 510)						▲								●	NA	59
Passaic River – Camp Lane						▲								●	NA	59
Passaic River – River Road boat launch						▲								●	NA	59
Pequannock River				■											NA	37
Pequannock River (trib.) (Copperas Mtn.)	▲	●	▲										▲		✓	43, 47, A64
Pompton Lake											●				NA	68
Primrose Brook	▲	●	▲										▲		✓	43, 47, A65
Ramapo River				■											NA	37
Rockaway River				■											NA	37
Rockaway River (trib.) (West Longwood Lk)	▲	●	▲										▲		✓	43, 47, A66
Ruckman's Pond												●	▲		NA	73
Sheppards Lake											●				NA	69
Stephen R. Gregg Park Pond												●	▲		NA	74
Success Lake													●		NA	75, 83
Toms River				■											NA	37
Wanaque River				■											NA	37

TABLE 1. 2015 field sampling locations (continued)

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

● Funding source or reason of data collection
▲ Data are applicable to additional projects
■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Raritan Region (Raritan, Arthur Kill, Raritan Bay, Shrewsbury, & Navesink)																
Beaver Brook (Hunterdon)	▲	●	▲												✓	43, 47, 96, A67
Beden Brook – Aunt Molly Road	▲												●		✓	83, A68
Beden Brook – Cherry Hill Road	▲												●		✓	83, A69
Beden Brook (trib) (Rocky Hill)	▲												●		✓	83, 96, A70
Black Brook	▲	▲	▲	■									▲		✓	40,43,47, A71
Blue Brook – Cataract Hollow Road													▲	●		121
Blue Brook– above Seeley's Pond													▲	●		121
Blue Brook – below Seeley's Pond													▲	●		121
Budd Lake											●				NA	63
Farrington Lake											●				NA	65
First Neshanic River							●									87, 90
Green Brook (Watchung/Plainfield)													▲	●		121
Hickory Run	▲	▲	▲	■									▲		✓	40,43,47, A72
Hooks Creek Lake												●	▲		NA	54
India Brook	▲	●	▲										▲		✓	43, 47, A73
Lake Surprise													▲	●	NA	121

TABLE 1. 2015 field sampling locations (continued)

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Raritan Region (Raritan, Arthur Kill, Raritan Bay, Shrewsbury, & Navesink) (continued)																
Lamington (Black) River – below Kay's Pond	▲		▲	■						●			▲		✓	30,37,43,A74
Lamington (Black) River – Hacklebarney SP	▲	▲	▲	■									▲		✓	30, 37, 43, 47, 96, A75
Lamington (Black) River – River Road West				■											NA	37
Moxon Pond (aka Moccasin Pond)													▲	●	NA	121
Mulhockaway Creek	▲	▲	▲										▲		✓	43, 47, A76
Neshanic River – Kuhl Rd							●									87, 90
Neshanic River – Cider Mill Rd	▲						●						▲		✓	87, 90, A77
Neshanic River (trib)(E of Hart Blvd) – Hart Blvd							●									87, 90
Neshanic River (trib)(Hart Blvd) – Samson Dr							●									87, 90
Neshanic River (trib)(Hart Blvd) – Hart Blvd							●									87, 90
Neshanic River (trib)(Hart Blvd) – Hart Blvd							●									87, 90
Neshanic River (trib)(Hart Blvd) – Kuhl Rd							●									87, 90
Raritan River, N/Br – Roxiticus Road	▲	●	▲										▲		✓	43, 47, A78
Raritan River, N/Br – Mosle Road	▲	●	▲										▲		✓	43, 47, A79
Raritan River, N/Br – off Peapack Road				■											NA	37

TABLE 1. 2015 field sampling locations (continued)

NEW JERSEY DIVISION OF Fish and Wildlife

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

- ● Funding source or reason of data collection
- ▲ Data are applicable to additional projects
- ■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Fish Health (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Raritan Region (Raritan, Arthur Kill, Raritan Bay, Shrewsbury, & Navesink) (continued)																
Raritan River, S/Br – Vasa Park			▲										▲	●		24, 43, A80
Raritan River, S/Br – Stephen's Mill Road	▲		▲							●			▲		✓	28, 43, 97, A81
Raritan River, S/Br – Bartley Road	▲		▲							●			▲		✓	28, 43, A82
Raritan River, S/Br – Claremont Stretch				■											NA	37
Raritan River, S/Br – Schooley's Mtn. Road	▲		▲							●			▲		✓	28, 43, A83
Raritan River, S/Br – Vernoy Road	▲		▲							●			▲		✓	28, 43, A84
Raritan River, S/Br – River Road	▲		▲							●			▲		✓	28, 43, 97, A85
Raritan River, S/Br – KLG – boulder field	▲		▲		●					●			▲		✓	26,28,43, 97, A86
Raritan River, S/Br – KLG – below trestle	▲		▲	■	●					●			▲		✓	26, 28, 37, 43, 97, A87
Raritan River, S/Br – Below Lake Solitude				■											NA	37
Raritan River, S/Br – Studdiford Drive							▲						●			43,83,90,A88
Raritan River, S/Br (trib)(Drakestown)	▲	▲	▲	■									▲		✓	40, 43, A89
Raritan River, S/Br (trib)(SW of Budd Lake)	▲	▲	▲	■									▲		✓	40, 43, A90
Raritan River, S/Br (trib)(Warmwater)	▲		▲										▲	●	✓	24, 43, A91
Raritan River, S/Br (trib)(Warmwater)			▲										▲	●		24, 43, A92
Rinehart Brook	▲	▲	▲	■									▲		✓	43,47,40,A93
Rocky Run	▲	▲	▲	■									▲		✓	40,43,47,A94
Rosedale Lake													●		NA	73, 83

TABLE 1. 2015 field sampling locations (continued)

Bureau of Freshwater Fisheries
2015 Field Sampling Activities

● Funding source or reason of data collection
▲ Data are applicable to additional projects
■ Continuous Temperature Monitoring

	Federal Grant F-48-R (Project I or II)										Hunter &Angler Fund					
	Classification (I)	Wild Trout Stream Reg. (I)	Brook Trout Assess. (I)	Temp. / DO Monitor. (I)	Special Reg. Trout As. (I)	Coolwater Assess. (I)	Invasive Species (II)	Con. & Rest. (II)	Anadromous (I)	Miscellaneous	Warmwater Assessment	Reproduction Checks	Native Fishes	Miscellaneous	RBA Stream Sampling Protocol Applied*	Results Page #
Raritan Region (Raritan, Arthur Kill, Raritan Bay, Shrewsbury, & Navesink) (continued)																
Round Valley Reservoir				●						●		▲		●	NA	33, 73
Second Neshanic River – Harmony School Rd							●									87, 90
Second Neshanic River - Johanna Farm Rd							●									87, 90
Seeley's Pond													▲	●	NA	121
Spruce Run Reservoir						●									NA	57
Stony Brook (Morris-Washington)	▲	▲	▲	■									▲		✓	40,43,47,A95
Sun Valley Brook	▲		▲	■									▲		✓	40, 43, A96
Topenemus Lake												●	▲		NA	75
Trout Brook (Hacklebarney)	▲	▲	▲	■									▲		✓	40,43,47, A97
Turkey Brook	▲	▲	▲	■									▲		✓	40,43,47, A98
Willhoughby Brook	▲	▲	▲	■									▲		✓	40,43,47, A99

** The Bureau of Freshwater Fisheries strives to use established sampling protocols for all field sampling efforts. However, certain sampling objectives adherence to established sampling protocols would be prohibitive to accomplishing project goals. In these instances non-standardized surveys are performed and are identified in appropriate areas within this document.*

COLDWATER FISHERIES

An Assessment of New Jersey Trout Production Systems: A Movement Towards Sustainability

Luke Diglio Ph.D., Seasonal Technician with the Bureau of Freshwater Fisheries since 2008, completed his doctoral degree in the spring of 2015 at Montclair State University Department of Biology and Molecular Biology. Doctor Diglio worked closely with Bureau staff, focusing his dissertation efforts to better understand wild trout in New Jersey. Particular aspects of his dissertation titled, "*An Assessment of New Jersey Trout Production Systems: A Movement Towards Sustainability*" included: 1) An inventory and analysis of wild Brook Trout in the headwaters of the South Branch of the Raritan River and the assessment of trout population trends across New Jersey, 2) A comparison of data trout population data from 1970's to the 2000's, including an analysis of landuse changes, 3) A review of New Jersey's management of Brook *Trout Production* waters. Biologist Shawn Crouse served on his doctoral committee, advising him throughout this process, including the collection fisheries field data, review all three Ph.D. dissertation chapters, and evaluation of his dissertation defense. Surveys and activities associated with this and other projects focused on the upper section of the South Branch of the Raritan River and its tributaries in recent years have been collectively referred to as the South Branch Headwaters Study. (Hunter & Angler Fund)

In 2015 as a follow-up to the South Branch Headwaters Study, A 1.5 mile stretch of the Raritan River South Branch was surveyed to determine if reproducing Brown Trout (non-native) have become established upstream of the old YMCA dam in Mount Olive Twp., which was previously exclusive to wild Brook Trout (native). Fortunate for wild Brook Trout in this watershed, no Brown Trout were found during the summer of 2015 survey, however only four wild Brook Trout were found in this 1.5 mile stretch (page A80). A second follow-up survey was conducted on a tributary to the South Branch of the Raritan River (referred to as Raritan River South Branch (Trib) (Warmwater), which was one of eleven tributaries surveyed in the river's headwaters during this project, but the only one in which Brook and/or Brown Trout were not initially encountered. On the final survey conducted from 2010 to 2012, two Brook Trout were eventually found. In 2015 no trout were found during the standardized survey, however three Brook Trout were encountered farther upstream in a non-standardized survey (page A92). As expected, additional tributaries upstream of the dam were sampled in 2015 which yielded Brook Trout. It is recommended to continue to not to stock any trout species upstream of the YMCA dam in the South Branch of the Raritan River or in its tributaries and to periodically monitor the fish assemblage upstream of the dam. See Appendix A (page A91) for more information. (Hunter & Angler Fund)

South Branch of the Raritan River during a high-flow event on September 8, 2011 at the YMCA dam.

Catch & Release Trout Regulation Assessment

Catch & Release fishing regulations were implemented in 2014 on sections of two trout-stocked streams – the Flat Brook/ Big Flat Brook and the Ken Lockwood Gorge on the S/Br. Raritan River. Both support reproducing trout populations. Electrofishing surveys have been conducted on these streams to provide data for evaluating the effect of the regulation change on these trout fisheries.

Flat Brook/Big Flat Brook- Four sites on the Flat Brook/Big Flat Brook Catch and Release regulation section were previously electrofished in 2012, 2013, and 2014. Although this stream reach is trout-stocked in the spring and fall, and naturally reproducing trout occurs within this section, few trout were encountered during these surveys (see table below). Trout appear to be utilizing deep, non-wadeable pools in this stream, as evidenced by the 2014 informal (non-standardized) electrofishing survey that was conducted in a large, deep pool (see footnote in table) in which 15 trout were captured and others eluded capture. In 2015, three of the four survey sites were moved slightly upstream or downstream of previous survey sites sampled in an attempt to determine if trout are utilizing other areas within the Catch & Release regulation section (see table below for summary of trout found). The Three Bridges site yielded significantly more trout. Additional information is compiled in Appendix A (pages A7-A9 & A14). (Hunter & Angler Fund)

Electrofishing locations along the Big Flat Brook and Flat Brook from 2012 – 2015.

Year	Water Temp	Total Trout	Brook Trout		Brown Trout		Rainbow Trout	
			Wild	Stocked	Wild	Stocked	Wild	Stocked
Big Flat (between Rt. 206 & Rt. 560 bridges (Old barracks)								
2012	19.9°C (67.8°F)	3				2		1
2013	17.1°C (62.8°F)	8	2			1		5
2014	17.6°C (63.7°F)	3	3					
Big Flat (Old Police Barracks) (page A7) (new site)								
2015	18.6°C (65.5°F)	6	3					3
Big Flat (Station 2 – upstream from Blewitt Tract)								
2012	20.8°C (69.4°F)	3	3					
2013	18.6°C (65.5°F)	7	5			1		1
2014	17.6°C (63.7°F)	8	5		3			
Big Flat (between Rt. 560 & "Warner's Hole") (page A8) (new site)								
2015	17.1°C (62.8°F)	10						10
Big Flat (Station 1 – upstream from Blewitt Tract) (page A9)								
2012	19.1°C (66.3°F)	8	7					1
2013		0						
2014	17.5°C (63.5°F)	2			2			
2015	19.3°C (66.7°F)	3	1					2
Flat Brook (above Roy Bridge - just downstream of rifle range pool)*								
2012	18.8°C (65.8°F)	6	1		1	2		2
2013	16.3°C (61.3°F)	4	1		1			2
2014	17.3°C (63.1°F)	2			1			1
Flat Brook (Three Bridges WMA) (page A14) (new site)								
2015	18.7°C (65.7°F)	48	1					47

* In addition to this site, the "rifle range pool" was electrofished. Due to the large size of the pool (wide, long, and deep) not all the trout were captured, however, a total of 15 trout (14 Rainbow Trout and 1 Brook Trout) were netted. They ranged in size from 11.3 – 15.7 inches and all appeared to be of hatchery origin (stocked). The brook has many pools similar to this one that hold trout but are difficult to effectively sample.

South Branch of the Raritan River- Known for its great scenery and fish habitat, the 2.5 mile section of the South Branch of the Raritan River known as the Ken Lockwood Gorge is very popular among anglers looking for Catch and Release / artificial lures only opportunities. Wild Brown Trout are plentiful in this section of river, with an increase in the amount of natural reproduction in recent years, although Brook Trout are rarely encountered, with never more than a few individuals. This section is stocked by NJDFW in both the spring and fall, however NJDFW did not stock trout in this section of the South Branch of the Raritan River in 2014 (spring and fall), due to a disease outbreak in the Pequest Trout Hatchery. Prior to 2014, this section was regulated as a Year Round Trout Conservation Area (TCA) (1 trout per day greater than 15 inches). The Catch and Release (C&R) regulations that went into effect in 2014 were monitored via two electrofishing surveys were conducted in 2015 (See table below and Appendix A (pages A86 & A87).

Over the last four sampling events in 2006, 2007, 2013, and 2015 the total number of all trout species encountered during electrofishing surveys have increased from 96 to 126 to 214 to 413 (see table below). In all years except 2015, Brown Trout were the most abundant species consisting almost exclusively of wild fish, which is the foundation of the fishery. Their numbers were trending upward from 84 to 73 to 150 until this year in which only 43 were captured. Wild Brook Trout exist in this section of river, but rarely with more than a few individuals. When broken down by species, the greatest difference noted is in regards to Rainbow Trout, which have increased from 9 to 23 to 50 to 362 in 2015. Although the total number of NJDFW stocked trout has remained constant over this timeframe (with the exception of no stocking in 2014), the number of Rainbow Trout was increased this year to make up for the lack of Brook and Brown Trout that were not stocked.

The number of trout over 9 inches has increased from 54 to 82 to 149 to 381 respectively, which meets a management objective to increase trout densities. The drastic increase to 381 trout can not be attributed to the new C&R regulation, as the majority of trout were under 15 inches, which could not be harvested under both the previous TCA regulation and the current C&R regulation. The abnormally high number of stocked Rainbow Trout, can be misleading if one were to assume there is a real increase in population size structure and not just a random occurrence. A second objective of the C&R regulation was to increase the number of trout over 15 inches, however this number has not increased as it went from 0 to 2 to 6 to 3 in 2015. This may have been affected by the fact that broodstock trout were not stocked here in the fall of 2014, which likely contribute greatly to the number of large trout in this section. It is recommended to continue to monitor the fish assemblage within the Ken Lockwood Gorge WMA to assess the C&R regulations. Additional information is compiled in Appendix A (pages A86 & A87) (Federal Grant F-48-R, Project I)

Electrofishing locations within the Ken Lockwood Gorge from 2006 – 2015.

Year	Water Temp	Total Trout	Brook Trout		Brown Trout		Rainbow Trout	
			Wild	Stocked	Wild	Stocked	Wild	Stocked
Boulder Field (page A86)								
2006*	13.7°C (56.7°F)	49	2		41		6	
2007*	18.9°C (66.0°F)	73	18		44		11	
2013	19.8°C (67.6°F)	70		2	54	1	2	11
2015	25.0°C (77.0°F)	168	1		26	2	2	137
Below Trestle (page A87)								
2006*	13.7°C (56.7°F)	47	1		43		3	
2007*	18.9°C (66.0°F)	53	12		29		12	
2013**	18.4°C (65.1°F)	144 **		9	84	13		37
2015	22.8°C (73.0°F)	245	1		17	7		221

* Wild and stocked trout were not adequately differentiated during the 2006 and 2007 surveys.

** One wild Tiger Trout (Brook Trout X Brown Trout) was collected at this site.

Bureau of Freshwater Fisheries Electrofishing Survey conducted in the Ken Lockwood Gorge Wildlife Management Area during the summer of 2006.

General Fisheries Surveys

South Branch of the Raritan River- The South Branch of the Raritan River was electrofished at 5 locations above the Ken Lockwood Gorge WMA (KLG) upstream to Mount Olive in both 2014 and 2015, consisting of one survey approximately every three to four miles along the river. These fish assemblage surveys were conducted to provide: 1) baseline fisheries data that in many cases has not been collected in approximately 20 years, 2) a rare opportunity to conduct surveys during a year in which the NJDFW did not stock trout due to the Furunculosis outbreak in the Pequest Trout Hatchery (2014), 3) assessment of wild trout fishery, and 4) disease surveillance following Furunculosis positive trout were found in the KLG (2014). (Hunter & Angler Fund)

Trout Trifecta from the Bartley WMA: stocked Rainbow (top), wild Brown (bottom left), and wild Brook (bottom right)

Trout were collected at all seven survey locations, consisting of large numbers of wild Brown Trout, moderate levels of wild Brook Trout, and a few wild Rainbow Trout (see table below). The surveys in Long Valley near Schooley's Mountain consistently yields the highest number of both wild Brook and wild Brown Trout. As expected the KLG holds the largest number of stocked trout, as it is regulated as a Catch & Release Area. The fewest number of wild Brook Trout were encountered at the extreme ends of the river near Stephen's Mill Road and in the KLG. Future efforts in data collected under the Stream Temperature Monitoring project (page 37) might help explain this distribution, although it is understood that temperatures within the KLG can become elevated during the summer months. Surveys are in-line with other statewide observations that indicate a shift towards increasing wild Brown Trout abundance, in lieu of wild Brook Trout.

None of the trout encountered had visual symptoms of Furunculosis and all fish appeared healthy.

Additional information is summarized in table below and compiled in Appendix A (pages A81-A87) and in the Surface Water Classification Assessment section (page 95). Subsequent surveys would be beneficial to assess the current stocking program and management of the river and to monitor for the presence of Furunculosis in the fishery.

Electrofishing locations along the Raritan River S/Br in 2014 -2015.									
Year	SWQS Classification	Water Temp	Total Trout	Brook Trout		Brown Trout		Rainbow Trout	
				Wild	Stocked	Wild	Stocked	Wild	Stocked
Stephen's Mill Road, Mount Olive Twp., Downstream of Mt. Olive Complex Dam (page A81)									
2014	FW2-TM *FW2-TP(C1)	17.7°C (63.9°F)	34			34			
2015	same	16.2°C (61.2°F)	34			34			
Bartley Road, Washington Twp., Bartley Wildlife Management Area (page A82)									
2014	FW2-TP(C1)	15.7°C (60.3°F)	38	3		35			
2015	same	23.5°C (74.3°F)	58	16		33			9
Schooley's Mountain Road, Washington Twp., Downstream of Claremont Stretch (page A83)									
2014	FW2-TP(C1)	17.8°C (64.0°F)	128	47		79		2	
2015	same	24.7°C (76.5°F)	137	66		63		2	6
Vernoy Road, Tewksbury Twp., Below Vernoy Road Bridge (page A84)									
2014	FW2-TP(C1)	17.0°C (62.6°F)	56	7		49			
2015	same	20.1°C (68.2°F)	85	7		56		10	12
Raritan River Road, Lebanon Twp., Across from Hickory Run and Little Brook (page A85)									
2014	FW2-TM *FW2-TP(C1)	18.3°C (64.9°F)	24	6		16		1	1
2015	same	21.4°C (70.5°F)	54	10		16			28
Ken Lockwood Gorge WMA, Boulder Field (page A86)									
2015	FW2-TM *FW2-TP(C1)	25.0°C (77.0°F)	168	1		26	2	2	137
Ken Lockwood Gorge WMA, below Trestle (page A87)									
2015	FW2-TM *FW2-TP(C1)	22.8°C (73.0°F)	245			17	7		221

* Proposed change to SWQS based on data previously submitted to Bureau of Water Monitoring and Standards, Environmental Analysis Restoration and Standards.

14.6 inch South Branch Wild Brown Trout

Northern Pike captured in the S/B (escapee from Budd Lake)

Lamington (Black) River -During 2014, six surveys were conducted along the Lamington (Black) River from the Kay Environmental Center downstream to Fiddler's Elbow Country Club along Rattlesnake Bridge Road, spanning 11.5 miles of the river to: 1) compare current status of the fishery to the existing Surface Water Quality Standards (SWQS), 2) collect baseline fisheries data that in many cases has not been collected in many years, 3) gather baseline data in within the confines of Fiddler's Elbow Country Club prior to a planned stream habitat project that was conducted in December of 2015. The two surveys near the Kay Environmental Center and in Hacklebarney State Park were surveyed again in 2015. Both surveys are within the section of the river that is classified as *Trout Maintenance*. Bureau staff also assisted Biologist Jeanette Bowers of the Endangered and Nongame Species Program in conducting a freshwater mussel survey in the Lamington River at Fiddlers Elbow Country Club. (Federal Grant F-48-R, Project I)

In 2015 the Lamington (Black) River was surveyed immediately downstream of Kay's Pond within the Morris County Park System, 0.6 miles upstream from a survey conducted in 2014 near the Kay Environmental Center. The 2014 survey uncovered three wild Brook Trout older than young-of-the-year (YOY), but no YOY. A follow-up survey was conducted in 2015, hoping to find YOY Brook Trout, however only one stocked Rainbow Trout was found (see table below). For more information see Appendix A (page A74).

The second site was a replicate of a location surveyed in 2014 in the middle of Hacklebarney State Park. In 2014, 8 trout were encountered (1 stocked Rainbow, 1 stocked Brook and 6 wild Browns), with 0 YOY. Twenty-six trout were found in 2015 (13 Rainbow Trout, including 6 stocked fish as indicated by fin erosion and size (226 – 427 mm) and 7 ranging from 134 – 182 mm that were presumed to be of wild origin at the time. Upon further inquiry, they may be fish released from the NJDFW's Trout in the Classroom program, which switched from Brook Trout to Rainbow Trout in recent years. Twelve wild Brown Trout (including 6 YOY), and one wild Brook Trout was also found (see table below). For more information see Appendix A (page A75).

Hacklebarney State Park

Comparative surveys conducted within the Lamington River in 2014 and 2015.									
Year	Current SWQS Classification	Water Temp	Total Trout	Brook Trout		Brown Trout		Rainbow Trout	
				Wild	Stocked	Wild	Stocked	Wild	Stocked
Kay Environmental Center, Chester Twp. (page A74) 0.6 miles upstream of 2014 survey									
2014	FW2-TMC1	20.4°C (68.8°F)	3	3					
2015	same	20.9°C (69.6°F)	1						1
Hacklebarney State Park, Washington Twp. (page A75)									
2014	FW2-TMC1	18.3°C (64.9°F)	8		1	6			1
2015	same	20.8°C (69.4°F)	26	1		12		7*	6

* Rainbow Trout (134 – 182 mm) presumed to be of wild origin, however they may have been a result of an approved stocking event from the Trout in the Classroom program.

Potential changes to NJ's SWQS were compiled based on 2014 data, to move the *Trout Production* section upstream to the confluence with Rinehart Brook, however the additional wild Brown Trout YOY collected in 2015 warranted a modification. It is now recommended that the *Trout Production* section be moved upstream to the confluence with Trout Brook (pages 95). Further investigation is needed to identify factors limiting the reproductive capacity of trout in the vicinity of Kay Environmental Center down through Hacklebarney State Park, as the habitat is optimal and there are several *Trout Production* streams nearby.

Lamington River Wild Brown Trout YOY measuring 70 mm (2.8 inches)

Brook Trout captured in Hacklebarney State Park during the summer of 2014, presumably stocked in 2013

Inventory of Trout Production Streams

Waters used by trout for spawning and nursery areas are classified as *Trout Production* under the state's Surface Water Quality Standards. New Jersey has nearly 200 *Trout Production* streams and most of these are small tributaries and headwaters of larger rivers in the northern part of the state. Wild, naturally reproducing trout are important indicators of healthy ecosystems, requiring superior water quality and pristine habitat. Despite the protection that state regulatory programs afford *Trout Production* waters, ongoing changes in land use have impacted these coldwater fisheries populations. In particular wild Brook Trout, New Jersey's only native trout species, have declined dramatically over the last century due to land use changes which have affected the quality of their habitat.

Trout Production streams are monitored periodically (once every 20 years, or every 5 years if regulated as a *Wild Trout Stream*) to assess the status of their naturally reproducing trout populations. Surveys are conducted using established protocols which include electrofishing a 150 m reach, physicochemical measurements, and the EPA Rapid Bioassessment for habitat (with regional modifications) (Barbour et al. 1999) (Appendices C and D). The data collected through these surveys are evaluated to determine if population changes have occurred and in the development management strategies and fishing regulations to protect this fragile resource. The data are also used by the Eastern Brook Trout Joint Venture (a National Fish Habitat Partnership) as part of a range wide effort to conserve and manage Brook Trout in the eastern U.S. (Federal Grant F-48-R, Project I)

In 2015 two *Trout Production* streams (Franklin Pond Creek and Knowlton Brook) were surveyed (see table below). Franklin Pond Creek (Sussex), a tributary to the Wallkill River, is also annually stocked in the spring with catchable-size Rainbow Trout. When surveyed in 2015, this stream was devoid of wild trout, however four stocked Rainbow Trout were captured. Brook and Brown Trout reproduction was originally documented in 1991 (only a few individuals captured), however, in a subsequent survey (1994) no wild trout were found (only 2 stocked Rainbows). In the 2015 survey of Knowlton Brook, a tributary to the Delaware River, only one adult wild Brown Trout was found. Detailed results for each stream survey conducted in 2015 are provided in Appendix A (pages A16 & A19). It is recommended that additional surveys on both these streams are needed to better assess their wild trout populations.

Results of electrofishing surveys conducted on 2 streams as in New Jersey during 2015 as part of a monitoring program for streams classified as *Trout Production*. An "*" following the species name indicates that older than young-of-the-year trout were found and these were considered wild based upon a visual assessment of fin wear.

	2015			Prior to 2015	
Stream (County) and location	Survey date	Reproducing trout species	Results page #	Survey date	Reproducing trout species
Upper Delaware Region (Upper Delaware & Wallkill)					
Franklin Pond Creek (Sussex)	7/21/15	none	A16	8/31/94	none
Off Rt. 23, near Forest Fire bldg.				8/28/91	Brown/Rainbow
Knowlton Brook (Warren) Off Knowlton Road	8/18/15	Brown*	A19	7/10/90	Brown

Lake Trout Population Assessment

Lake Trout (*Salvelinus namaycush*) fisheries exist in two waterbodies within New Jersey, Round Valley Reservoir and Merrill Creek Reservoir. Although stocked for years, the Lake Trout populations in these two reservoirs are now entirely supported by natural reproduction and are no longer stocked by NJDFW's Hackettstown State Fish Hatchery. Surplus Lake Trout were periodically stocked into Monksville Reservoir from 2004 - 2012, however it did not develop into a significant fishery. As a result, Lake Trout are no longer stocked in NJ.

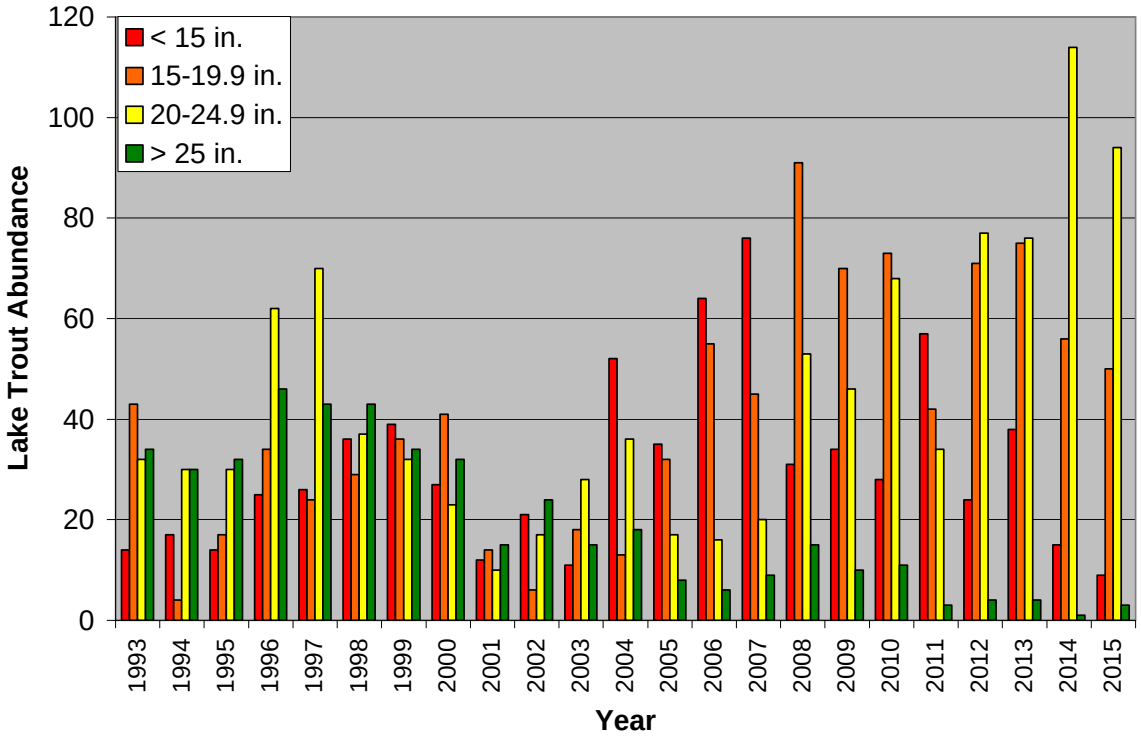
Round Valley Reservoir- The Lake Trout population in Round Valley Reservoir is closely monitored by NJDFW to evaluate the status of this trophy trout fishery. Lake Trout reared at the Hackettstown State Fish Hatchery were stocked in this deep reservoir (maximum depth 160 feet) from 1977 until 1995. In 1985, evidence that natural reproduction was occurring within the reservoir was documented. By 1995 it was determined that the population was capable of maintaining itself by natural reproduction, thus stocking was discontinued. Gill net surveys are conducted every fall, when mature Lake Trout seek out suitable spawning habitat along the boulders lining the reservoir's dams. Eight experimental gill nets, each net with varying mesh size openings, are used to capture a range of Lake Trout from juveniles to sub-adults. Eight additional large-mesh gill nets (6" stretch mesh) are set near the reservoir's north and south dams to capture mature Lake Trout as they begin congregating to spawn over the rocky substrate. Length and weight data are collected to assess physical condition of the fish using relative weight analysis. In addition, sex, fin clips, and sexual development information are also recorded. (Federal Grant F-48-R, Project I)

The largest Lake Trout collected during the 2015 RVR gill net surveys was this 22.6 lb. female

In 2015 the large-mesh gill nets set overnight and retrieved on November 12 and 17, resulted in the capture of 98 Lake Trout ranging from sub-adults to adults. Combined with 58 juvenile to sub-adults captured with experimental gill nets on October 27 and 28, the 156 Lake Trout is average for surveys conducted since 2006. The number of Lake Trout encountered during our monitoring program over 25 inches has steadily declined since 1996. During the mid-1990's more than 40 individual fish over 25 inches were documented. That number has decreased to single digits in recent years (see figure below). Unfortunately, the trend of decreasing numbers of large Lake Trout is resulting in a less-desirable trophy Lake Trout fishery. 2014 was the first year no Lake Trout over 30 inches or over ten pounds were caught, however two large Lake Trout were caught in 2015. The largest individual was a female measuring 39.3 inches and weighing 22.6 lbs (see photo above). Despite few individuals reaching trophy proportions, the Lake Trout population is doing well, as the total number documented while monitoring has steadily increased since 2001.

In 2008 and then again in 2012, the regulations were modified to increase harvest, aiming to reduce competition and facilitate better condition and faster growth. This management strategy seems to have worked, as the number of Lake Trout from 15 to 20 inches has declined, while those from 20 to 25 inches have increased (see figure below). NJDFW plans to continue to encourage the harvest of Lake Trout from 15 to 24 inches with the intention of achieving a more desirable trophy fishery.

Number of Lake Trout captured (by size) during annual gill net surveys at Round Valley Reservoir since 1993.



Round Valley Reservoir Salmonid Diet Study – In order to better understand the composition of trout diets in Round Valley Reservoir, volunteers from Round Valley Trout Association collected trout stomachs from fish that were caught during their monthly tournaments. The primary purpose was to determine if the contribution of baitfish (primarily Alewives and Golden Shiners) in the diet of Rainbow, Brown, and Lake Trout in Round Valley Reservoir. Stomachs were preserved in ethanol and later analyzed by NJDFW staff. Ninety-eight stomachs were collected on 12 different days from April 16 to September 12. Of the 90 Lake Trout, only 4 had fish in their stomachs (2 unknown Clupeids and 2 unknown Shiners, however 1 had a hook in its back). Results were similar to previous efforts during 2006, 2007, 2009, and 2010 with 8 of 158 (5%) of Lake Trout having fish in their stomachs, with scuds (Gammarus sp.) (see photo above) composing the most significant portion of the diet of Lake Trout. One of six Rainbow Trout had decomposed fish in its stomach (thought to be an Alewife). One of two Brown Trout had 12 unknown shiners in its stomach. The data will be used, in conjunction with other measures, to determine the status of the baitfish population at the reservoir.

Typical RVR Lake Trout stomach filled with scuds (Gammarus sp.)

Merrill Creek Reservoir- Merrill Creek Reservoir is a 650-acre privately-owned reservoir located in Harmony Twp., Warren County that is open to public fishing. Following construction and filling in 1988, a variety of fish species have been stocked in this deep-water reservoir (200 ft deep) by NJDFW to establish and maintain desirable sport fisheries for Smallmouth Bass as well as Rainbow, Brown, and Lake Trout. The reservoir's fishery is managed by the Merrill Creek Owners Group in cooperation with Fish and Wildlife. This team meets annually to review and discuss fisheries data collected by the owner and their consultant, and to make management decisions. In recent years, Lake Trout have been the primary management focus and the owner's consultant annually monitors the Lake Trout population in the fall using gill nets. When the gill net survey data indicated that Lake Trout were naturally reproducing in the reservoir, stocking of this species was discontinued in 2013. (Hunter & Angler Fund)

In 2015, to supplement fisheries data collected by the owners' fisheries consultant, the Bureau of Freshwater Fisheries deployed four experimental gill nets overnight (November 5 – 6) to target small Lake Trout. A total of 30 fish were captured, representing 6 species (Lake Trout, Smallmouth Bass, Rock Bass, Yellow Perch, Brown Bullhead, and Alewife). Only 20 Lake Trout were captured, compared to 27 in 2014. The Lake Trout captured in the 2015 survey ranged in size from 227–760 mm (8.9–29.9 in). The largest fish (pictured above) weighed 4.8 kg (10.7 lb). Eight of the Lake Trout were fin clipped, signifying that they were stocked (hatchery origin). The remaining 12 lakers captured were not fin-clipped and are considered to be the product of natural reproduction. (Hunter & Angler Fund)

10.7 lb. Lake Trout from Merrill Creek Reservoir held by Charlie Dix of Normandeau Associates

Landlocked Salmon

Only a handful of deep lakes in New Jersey have suitable year round habitat for coldwater fish like trout and salmon. Landlocked Salmon (lake dwelling form of Atlantic Salmon *Salmo salar*) prefer water temperatures less than 21°C (70°F) and dissolved oxygen levels greater than 5 mg/L, but can withstand warmer, less oxygenated water conditions for short periods. Although not native to New Jersey, Landlocked Salmon were stocked in several NJ waters over a half-century ago, and the historical state record for Landlocked Salmon is an 8 pound fish caught from Lake Aeroflex in 1951.

In 2006, Fish and Wildlife began stocking Landlocked Salmon into two north Jersey lakes, Lake Wawayanda and Lake Aeroflex (Sussex), to provide anglers with an opportunity to fish for this unique coldwater sport fish close to home. The salmon stocked are surplus fish provided by Massachusetts Division of Fisheries and Wildlife in exchange for surplus Northern Pike from the Hackettstown State Fish Hatchery.

From 2006-2013, spring yearling salmon at about 200 mm (8 in) were stocked each May in lakes Wawayanda and Aeroflex immediately upon their arrival from Massachusetts. In 2013 the Hackettstown State Fish Hatchery began retaining some of salmon for 4-11 months and growing them to a much larger size (300-500 mm or 12-20 inches) before stocking. In 2014 Tilcon Lake (Morris) was added to the salmon stocking program. Our ability to stock salmon at a larger size has been making a big difference in both angler interest and angling success. (Hunter & Angler Fund)

Tilcon Lake salmon stocking yields immediate results

Tilcon Lake- In 2015 a temperature/dissolved oxygen profile was conducted at Tilcon Lake on August 28 in the deepest part of the lake (50 ft max depth). Trout supporting water (criteria: water temperature $\leq$ 21ºC (69.8ºF) and dissolved oxygen $\geq$ 4 mg/L) was documented 6.4-13.7 m (21-45 ft) beneath the water's surface (Appendix B page B3).

Stream Temperature Monitoring

In 2013 the Bureau established an ambient stream temperature monitoring network on streams having trout fisheries that are recreationally important or of conservation interest. The temperature data collected will be used to assess current temperature conditions, evaluate long term trends, determine if ambient water quality is consistent with NJDEP's Surface Water Quality Standards, and aid in the management of coldwater (trout) fisheries inhabiting these streams. Integral to the establishment of this monitoring network was the development of a quality assurance plan that complied with NJDEP's regulations concerning the certification of laboratories and environmental measurements under N.J.A.C. 7:18-1 et seq. A Quality Assurance Project Plan (QAPP) for Ambient Stream Water and Air Temperature Monitoring was prepared and subsequently approved by NJDEP's Office of Quality Assurance in July 2013. This certification is renewed annually. (Federal Grant F-48-R, Project I)

In 2015 water temperature was monitored at 39 sites (Table 1), including 2 new sites on the Lamington (Black) River (below Kay's Pond and south of Route 78 by Fiddler's Elbow Country Club), 2 new sites on the Paulins Kill, and 9 new sites on *Trout Production* streams located primarily inside the South Branch of the Raritan River watershed. Twenty-five of the sites are located on 17 recreationally important, trout-stocked streams. Seventeen sites were located on stream sections classified as FW2-*Trout Production* (TP), nineteen were on stream sections classified as FW2-*Trout Maintenance* (TM), and three were on stream sections classified FW2-*Non-Trout* (NT). Five sites were located on small streams having populations of wild Brook Trout, as part of the Eastern Brook Trout Joint Venture initiative to assess climate change (using paired water/air thermographs). A total of 44 thermographs (Onset Hobo Pro v2) were deployed to record temperature at 30 minute intervals year round. The thermographs were calibrated and regularly checked to maintain the validity of the temperature data. The following results are only inclusive of the twenty-five stream temperature monitoring sites located on 17 recreationally important trout-stocked. For full report, see Appendix F.

Trout Stocked Waters

The stream temperature data collected in 2015 indicates that many of the streams stocked with trout experienced summer water temperatures that were stressful for trout. Much of the State experienced low rainfall and consistently warm air temperatures. Many of the stream sections monitored and classified as *Trout Production* or *Trout Maintenance* exceeded their respective rolling seven-day average of the daily maximum temperature criteria (23°C). At some of the *Trout Maintenance* sites, stream temperature criteria was exceeded over long periods of time causing chronic exposure of stocked trout to warm water (unless the trout are able to find areas of thermal refuge). This is a large concern as already marginal habitat is becoming less hospitable for the game fish that are stocked here for recreational anglers to access. One of the concerns of rising stream temperatures for NJDFW's trout stocking program is that the trout will simply not reside close to their stocking points. This is not so much of an issue around the opening day of trout season, which occurs during the first or second Saturday in April, but when temperatures start to increase as the summer begins, sections of streams that typically had the ability to hold trout, will no longer be hospitable to trout. Currently, anglers report catching stocked trout on many of the trout stocked streams found in the table below, late into the summer and holdover trout are common. As

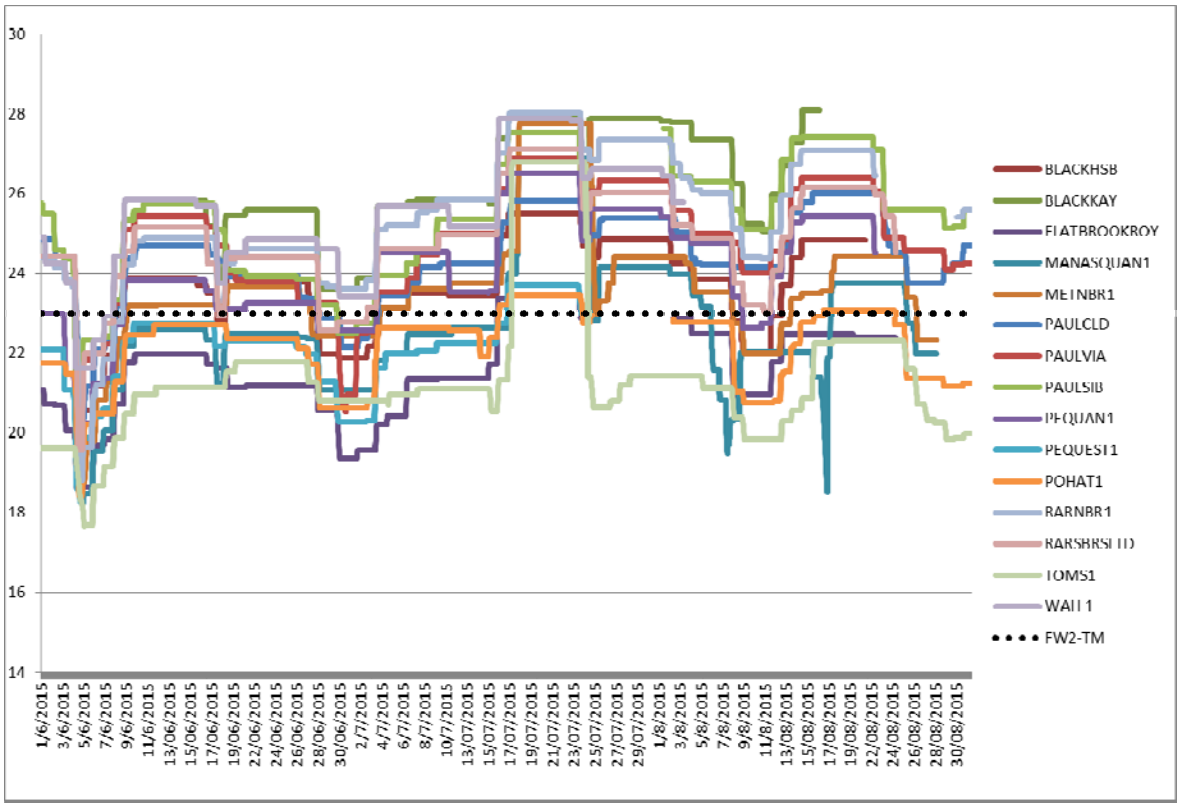
temperatures continue to climb, there will be fewer habitats to occupy and stocked trout may find refuge elsewhere or competition for limited space may increase, impacting survival.

2015 NJDFW stream temperature monitoring network on recreationally important trout-stocked streams.

Stream	Site ID	Surface Water Classification	Monitoring Type
Black River	BLACKHSB	Trout Maintenance	water
Black River	BLACKKAY	Trout Maintenance	water
Black River	BLACKFID	Non-Trout	water
Big Flat Brook	FLATBROOK206	Trout Production	water
Big Flat Brook	FLATBROOKBLW	Trout Production	water
Flat Brook	FLATBROOKROY	Trout Maintenance	water
Manasquan River	MANASQUAN1	Trout Maintenance	water
Metedeconk River, N/Br	METNBR1	Trout Maintenance	water
Metedeconk River, S/Br.	METSBR1	Non-Trout	water
Musconetcong River *	MUSKY1	Trout Maintenance	water
Paulinskill	PAULCLD	Trout Maintenance	water
Paulinskill	PAULVIA	Trout Maintenance	water
Paulinskill	PAULSIB	Trout Maintenance	water
Pequannock River	PEQUAN1	Trout Maintenance	water
Pequest River	PEQUEST1	Trout Maintenance	water
Pohatcong Creek	POHAT1	Trout Maintenance	water
Ramapo River	RAM1	Non-Trout	water
Raritan River, N/Br.	RARNBR1	Trout Maintenance	water
Raritan River, S/Br. ***	RARSBRKLG	Trout Maintenance	water
Raritan River, S/Br.	RARSBRCLMT	Trout Production	water
Raritan River, S/Br.	RARSBRSLTD	Trout Maintenance	water
Rockaway River **	ROCK1	Trout Maintenance	water
Toms River	TOMS1	Trout Maintenance	water
Wallkill River	WALL1	Trout Maintenance	water
Wanaque River **	WAN1	Trout Maintenance	water

* Thermograph lost in 2014 and not replaced in 2015. Location will be monitored in 2016.
** Thermograph lost in 2015
*** Error in installation or launching resulted in unreliable data

The graph below depicts the 7-day rolling average of the daily maximum stream temperature for each site monitored during summer weeks encompassing June 1 to August 31, 2015. The horizontal black-dotted line "FW2-TM" depicts the rolling 7-day average of the daily maximum of 23°C surface water criteria that *Trout Maintenance* streams should not exceed.



Trout Production Streams

Due to continued human impacts, we know that unprotected habitats that are currently marginal for fish survival, in both space and time, will continue to degrade in temperature, flows, and other stream characteristics, and will exceed biological tolerances of sensitive species such as trout. Whether the causative factors of these abiotic responses are induced from climatic forces or from a localized disturbance, the necessity to monitor these changes closely is driven by their tendency to be subtle and virtually invisible unless monitored closely. Background data from stream temperature monitoring established in 2013 by NJDFW and fisheries surveys done in close proximity to temperature monitoring sites resulted in the following observations:

- Streams experiencing the coldest temperatures during trout egg incubation (i.e. Flat Brook) have low wild trout recruitment.
  Note: Emergence times are delayed by cold winter stream temperatures, which may have led to low survival of wild trout (less time/slow growth, more subjected to redd scour from spring flows)
- *Trout Production* streams with higher Growing Degree Days (GDD) had better recruitment (slightly warmer streams).

These observations suggested the next steps to determine the limiting factors of recruitment of trout in New Jersey and if metrics could be developed for use in the monitoring of stream temperatures and in management of *Trout Production* streams.

2015 marks the beginning of a three year study to collect year-round continuous stream temperature data on wild *Trout Production* streams and assess their naturally reproducing trout populations. This study was initiated because excessively cold fall and winter temperatures (approaching 0°C) limit wild trout recruitment via late emergence and slow growth. The study was designed and fourteen *Trout Production* streams were picked, based on location (i.e. watershed, proximity to our office) and on population structure (struggling or well established trout populations) to help investigate this. On these streams, three years of year-round stream temperature monitoring and electrofishing surveys in these same locations will be conducted. The ultimate goals of the study are multi-faceted: (1) to develop a year to year analysis of how stream temperature is influencing New Jersey's wild trout populations, (2) submit data to NJDEP to determine if any streams qualify as part of 303(d) list, and (3) to develop metrics based on GDD, an understanding of emergence times, critical summer time temperatures, fall/winter/spring temperatures, and/or aerobic scope curves that can guide us in determining what streams are the best candidates for possible translocations.

Starting in the spring of 2015, 14 *Trout Production* streams were selected and stream temperature monitoring devices were placed. The fourteen streams included: Willhoughby Brook, Forked Brook, Stony Brook (Morris-Washington), Turkey Brook, Stephensburg Brook, Beerskill Creek, Hickory Run, Raritan River S/Br. (Trib.)(Drakestown), Raritan River S/Br. (Trib.)(SW of Budd Lake), Rocky Run, Trout Brook (Hacklebarney), Rinehart Brook, Sun Valley Brook, and Black Brook. Subsequently, this summer, backpack stream electrofishing surveys were conducted on these streams following EPA bioassessment protocols to determine abundance and sizes of wild trout present. A full report will be provided at the end of the study period.

Trout Stocking Allocations

NJDFW's Bureau of Freshwater Fisheries annually determines which waterbodies and how many trout per waterbody to be stocked statewide. The allocation methodology uses a combination of biological, physical, and social factors to equitably allocate trout over a 10-week period in the spring, 2-week period in the fall, and 1-week period in the winter. A computerized database containing variables for each stream, lake, and pond is used in conjunction with a formula to calculate individual weekly allotments of trout. The database is annually reviewed and updated by biologists. (Hunter & Angler Fund)

Beginning in the spring of 2015, all of the fish stocked out of the Pequest Trout Hatchery were Rainbow Trout only. In 2014, the Pequest Trout Hatchery had a serious Furunculosis outbreak occur that affected mostly Brook Trout and Brown Trout. Rainbow Trout in the hatchery showed a higher resistance to this Furunculosis outbreak. In an attempt to rid the hatchery of the Furunculosis bacterium, it was decided to raise only the more disease resistant Rainbow Trout out of the Pequest Hatchery for at least the next couple of years.

There were no changes to the "Trout Formula" methodology used to determine 2015 spring trout allocations. A spring baseline of 570,000 trout continues to be used to determine individual weekly allocations. Significant allocation changes for individual waterbodies are listed below.

Dropped for 2015:

Hamilton Fire Pond (Monmouth Co.) is a privately owned pond, in which the property owners allowed fishing in the pond for years, but have decided to not allow fishing any longer, therefore it has been dropped from the Trout Stocking Program.

Ongoing Issue / Concern:

Due to the storms that affected the region in October of 2012, biologists have been closely monitoring Hooks Creek Lake located in Cheesequake State Park (Middlesex Co.). Storm surge from Hurricane Sandy pushed saltwater from the Atlantic Ocean into Hooks Creek Lake resulting in unsuitable salinity levels for trout and other freshwater fish species. Biologists monitored salinity levels prior to the spring trout stocking but determined that salinity levels did not drop sufficiently to allow trout stocking. However, salinity levels during the summer months dropped low enough to allow stocking and Hooks Creek Lake was stocked as part of the NJDFW's 2015 Winter Trout Stocking Program.

A summary of trout stocked from NJDFW's Pequest Trout Hatchery during 2015, by season and species, is found in the table below.

Spring 2015 Trout Stocking Summary				
Species	Type	Avg. Length	Lbs.	# Fish
Rainbow Trout	Production	11.4"	323,854	612,390
	Broodstock	17.8" & 21.4"	7,460	2,055
		Totals	**331,314**	**614,445**
Fall 2015 Trout Stocking Summary				
Species	Type	Avg. Length	Lbs.	# Fish
Rainbow Trout	Production	14.6"	29,610	20,985
	Broodstock	21.1"	3,129	745
		Totals	**32,739**	**21,730**
Winter 2015 Trout Stocked Lakes Program Summary				
Species	Type	Avg. Length	Lbs.	# Fish
Rainbow Trout	Production	14.6"	8,736	5,635
		Totals	**8,736**	**5,635**

Wild Brook Trout Assessment

Anthropogenic landscape changes and past management practices have negatively impacted New Jersey's freshwater resources, particularly Brook Trout, the state's only native trout species. Of the three species of trout that reproduce in New Jersey streams, Brook Trout are the least tolerant of habitat degradation. Habitat alteration and stream fragmentation, diminished water quality, and competition with non-native trout (Brown and Rainbow Trout) have contributed to the decline of wild Brook Trout in New Jersey. Wild populations of Brook Trout now persist in less than half their original range in New Jersey.

Wild Brook Trout

NJDFW actively participates in the Eastern Brook Trout Joint Venture (EBTJV), a unique partnership initiated in 2004 under the National Fish Habitat Initiative (*www.fishhabitat.org*). EBTJV is a geographically focused, locally driven, and scientifically based effort to protect, restore and enhance aquatic habitat throughout the range of the eastern Brook Trout. The Venture has produced a range-wide population assessment of wild Brook Trout; completed extensive work that identifies key threats to wild Brook Trout and their habitats; and developed conservation strategies to protect, enhance and restore wild Brook Trout. EBTJV has recently completed refining the subwatershed status map to the catchment scale and NJDFW conducts surveys to assess the status of Brook Trout in catchments that lack survey data. This data, as well as data from stream surveys conducted as part of other activities, is entered into FishTrack (NJDFW's computerized freshwater fisheries database) and shared with the EBTJV. (Federal F-48-R, Project I)

In 2015 two tributaries to Jefferson Lake (Sussex) were selected for survey because their location (within Allamuchy Mountain State Park), topography (mountainous, forested terrain), and aerial photography (which indicated flowing water) suggested that these streams may have reproducing trout populations. However, upon inspection (8/20/15) both streams (Jefferson Lake (trib.)(West) and Jefferson Lake (trib.)(Northwest)) were found to be completely dry (or nearly so) and could not be electrofished. In addition, 96 other surveys conducted in 2015, under a variety of other jobs and/or funding sources, provide data that can be used to document the presence and extent of wild Brook Trout populations. The results from the 96 surveys at 95 locations are summarized in the table below. Of the 43 surveys (31 streams) that documented wild Brook Trout, 27 surveys had only wild Brook Trout, 10 surveys had wild Brook and Brown Trout, 2 surveys had wild Brook and Rainbow Trout, and 4 surveys had all 3 trout species. Wild Brook trout were previously known to occur in all of these streams with the exception of one location on the Musconetcong River (downstream of the Point Mtn. Road bridge). The three wild Brook Trout captured were all older than young-of-the-year fish and were found where a small *Trout Production* stream (that has wild Brook Trout) enters the river. More evidence is needed in order to confirm that trout are reproducing in this large river. Twenty-seven of the ninety-six surveys documented wild Brown and/or Rainbow Trout (but not Brook Trout) as follows: 25 Brown Trout, 1 Rainbow Trout, and 1 Brown and Rainbow Trout. These two non-native trout species have been stocked in New Jersey for more than a century and because they are more tolerant than Brook Trout, over time they have established wild populations that compete with or have replaced wild Brook Trout.

Presence/absence of wild trout species in 96 surveys at 95 locations conducted during 2015. Streams were surveyed using the standard sampling protocol (150 m stretch electrofished) unless noted by "+". *WTS* indicates the stream is currently regulated as a *Wild Trout Stream*. A species was considered wild when young-of-the-year fish were present (BKT= Brook Trout; BNT=Brown Trout; RBT=Rainbow Trout). When only trout older than young-of-the-year were present, then fin wear and erosion were used to distinguish between wild fish (noted as "X*") and those considered to be of hatchery origin.

Stream	County	Location	Wild trout species			Results
			BKT	BNT	RBT	page #
Southern Region (Lower Delaware River and Lower Atlantic Coastal)						
Masons Run	Camden	Mansions Apartment Complex	X*			A2
Masons Run	Camden	Culvert on Branc Rd	X			A3
Upper Delaware Region (Upper Delaware & Wallkill)						
Bear Creek (*WTS*)	Warren	Rt. 613	X*			A4
Beatty's Brook	Hunterdon	Penwell Road	X	X*		A5
Beerskill Creek	Sussex	Cemetery Road	X			A6
Big Flat Brook	Sussex	Between Rt. 206 and Rt. 560	X*			A7
Big Flat Brook	Sussex	B/w Rt. 560 and Warner's Hole				A8
Big Flat Brook	Sussex	Upstream Blewett Tract (St #1)	X*			A9
Bowers Brook	Warren	Rt. 664	X			A10
Brass Castle Brook	Warren	Harmony-Brass Castle Rd	X			A11
Brass Castle Brook	Warren	Kayharts Lane		X		A12
Criss Brook	Sussex	Flatbrook Road	X			A13
Flat Brook	Sussex	Three Bridges (downstream)	X*			A14
Forked Brook	Sussex	Grau Road	X			A15
Franklin Pond Creek	Sussex	Off Rt. 23, near Forest Fire bldg.				A16
Hakihokake Creek (trib.)(Wydner)	Hunterdon	Javes Road		X		A17
Hances Brook (*WTS*)	Warren	Rt. 57	X*			A18
Knowlton Brook	Warren	Off Knowlton Road		X*		A19
Kymer Brook +	Sussex	Rt. 206, below Gardners Pond				A20
Kymer Brook +	Sussex	Rt. 206, behind Forest Fire bldg				A21
Kymer Brook +	Sussex	Brighton Road bridge				A22
Jefferson Lake (trib.)(Northwest) +	Sussex	Upstream of RR bed				N/A
Jefferson Lake (trib.)(West) +	Sussex	Upstream of RR bed				N/A
Lopatcong Creek	Warren	Rt. 519 - Warren Co. fairground		X		A23
Lopatcong Creek	Warren	Lock Street		X		A24
Lopatcong Creek	Warren	South Main Street		X		A25
Mill (Clove) Brook (*WTS*)	Sussex	Rt. 23 bridge		X*		A26
Mill (Clove) Brook	Sussex	Off Mashipacong Road	X*			A27
Mine Brook	Morris	Mine Hill Road				A28
Mine Brook	Morris	Drakestown Road, upstream	X			A29
Musconetcong River +	Hunt/Warren	Pt. Mtn. Rd. bridge, downstream	X*	X*		A30
Musconetcong River	Hunt/Warren	Pt. Mtn. Rd. bridge, upstream				A31
Musconetcong River	Hunt/Warren	Rt. 519, below Hughsville Dam				A32
Papakating Creek	Sussex	Roy Road				A33
Parker Brook (*WTS*)	Sussex	Crigger Rd Bridge (Stokes SF)	X*			A34
Paulins Kill +	Warren	Crisman Road below Paulina Dam				A35
Paulins Kill +	Warren	Sunset Hill Road				A36
Paulins Kill +	Warren	Vail Rd. Bridge				A37
Paulins Kill +	Warren	Station Rd. Viaduct		X*		A38
Paulins Kill +	Warren	Warrington Rd to Brugler Rd				A39

Paulins Kill +	Warren	Route 46 bridge		X*		A40/41
Pequest River (trib.) (Green Twp.) +	Sussex	Route 206				A42
Pequest River (trib.) (Readings Pond) +	Sussex	Phillips Road bridge				A43
Pohatcong Creek	Warren	Valley Road bridge, downstream		X		A44
Pohatcong Creek	Warren	Rt. 31 bridge, upstream		X		A45
Pohatcong Creek	Warren	Rt. 637, near farmer's bridge		X		A46
Shabacunk Creek	Mercer	Green Lane Bridge, upstream				A47
Sparta Glen Brook	Sussex	Rt. 620 Sparta Glen Park	X*			A48
Spring Mills Brook	Hunterdon	Rt. 519 (behind ice cream stand)		X		A49
Stephensburg Brook (*WTS*)	Morris	Stephensburg Road	X	X		A50
Stony Brook (*WTS*)	Sussex	Kittle Road & Coursen Road				A51
Stony Brook (*WTS*)	Sussex	Kittle Road	X			A52
Van Campens Brook (*WTS*)	Warren	Blairstown-Millbrook Road	X		X	A53
Van Campens Brook (*WTS*)	Warren	Watergate Rec Area	X		X*	A54
Van Campens Brook (*WTS*)	Warren	Van Campens Glen		X		A55
Van Campens Brook (*WTS*)	Warren	Depew Rec. Area	X*	X		A56
West Portal Creek	Hunterdon	Asbury-West Portal Road bridge		X		A57
Passaic Region (Passaic, Hackensack, & Hudson) and Upper Atlantic						
Bear Swamp Brook (*WTS*)	Bergen	Bear Swamp Road	X			A58
Black Brook	Morris	Whitebridge Rd bridge				A59
Hibernia Bk (trib.)(Lk Ames)	Morris	Snake Hill Road bridge	X			A60
Indian Grove Brook (*WTS*)	Somerset	Hardscrabble Road			X	A61
Mill Brook (Morris)	Morris	Fords Road		X		A62
Passaic River (*WTS*)	Somerset	Upstream of confluence with Indian Grove Brook		X	X	A63
Pequannock River (trib.) (Copperas Mtn.)	Morris	Green Pond Road	X	X		A64
Primrose Brook	Morris	Morristown NHP	X			A65
Rockaway River (trib.)(West Longwood Lake)	Morris	Paderewski Road				A66
Raritan Region (Raritan, Arthur Kill, Raritan Bay, Shrewsbury, & Navesink)						
Beaver Brook	Hunterdon	Old Highway 22		X		A67
Black Brook (*WTS*)	Hunterdon	Van Syckels Road		X		A71
Hickory Run (*WTS*)	Hunterdon	Hickory Run Road	X			A72
India Brook (*WTS*)	Morris	Mountainside Road		X		A73
Lamington (Black) River	Morris	State Park Road, downstream of Kay's Pond Dam				A74
Lamington (Black) River	Morris	Hacklebarney State Park, b/w Trout Brook & Rinehart Brook		X		A75
Mulhockaway Creek	Hunterdon	Norton Rd-Charleston Road	X*	X		A76
Raritan River N/B	Morris	Roxiticus Road		X		A78
Raritan River N/B	Morris	Mosle Road		X		A79
Raritan River S/B	Morris	Vasa Park (YMCA dam to Raritan River S/B (trib.)(SW Budd)	**X***			A80
Raritan River S/B	Morris	Stephens Mill Road, upstream		X		A81
Raritan River S/B	Morris	Bartley WMA (Bartley Road)	X	X		A82
Raritan River S/B	Morris	Schooley's Mtn. Road (Rt. 24)	X	X	X	A83
Raritan River S/B	Hunterdon	Vernoy Rd Bridge	X	X	X	A84
Raritan River S/B	Hunterdon	Off Raritan River Road	X*	X		A85

Raritan River S/B	Hunterdon	Ken Lockwood Gorge, Boulder Field	X*	X	X	A86
Raritan River S/B	Hunterdon	Ken Lockwood Gorge, below trestle		X		A87
Raritan River S/B	Somerset	Studdiford Drive bridge				A88
Raritan River S/B (trib.) (Drakestown)	Morris	Joy Drive	X			A89
Raritan River S/B (trib.) (SW of Budd Lake)	Morris	Rt. 46 culvert, downstream from Joy Drive	X			A90
Raritan River S/B (trib.) (Warmwater)	Morris	River Road, pulloff upstream of Flanders-Drakestown Road				A91
Raritan River S/B (trib.) (Warmwater) +	Morris	River Road, pulloff upstream of Flanders-Drakestown Road	X*			A92
Rinehart Brook (*WTS*)	Morris	Hacklebarney State Park		X		A93
Rocky Run (*WTS*)	Hunterdon	Rocky Run Road	X			A94
Stony Brook (*WTS*)	Morris	Columbia Trail Walking Bridge	X	X	X	A95
Sun Valley Brook	Morris	Wolfe Road				A96
Trout Brook (*WTS*)	Morris	Hacklebarney State Park	X			A97
Turkey Brook (*WTS*)	Morris	Stephens Mill Road	X	X		A98
Willhoughby Brook (*WTS*)	Hunterdon	Rt. 31	X*	X		A99

Young-of-the-year and sub-adult Brook Trout from the South Branch of the Raritan River

Wild Trout Stream Regulation Assessment

Fish & Wildlife has documented reproducing trout populations in nearly 200 streams (or stream segments) statewide, but only a handful of these (36) are currently designated as *Wild Trout Streams* (*WTS*). The majority of the *WTS* are tributaries to larger, trout-stocked streams. However, *WTS* are not stocked with hatchery trout, but rather rely upon their wild, naturally reproducing trout populations to provide a recreational fishery.

The *WTS* regulation is more stringent than the statewide general trout regulation and has changed little since it was adopted in 1990. Over time several streams have been added or taken off the *WTS* list. More notably, in 2008 when the general statewide minimum harvestable size for trout was increased from 178 to 305 mm (7 to 9 in) this change was also made to the *WTS* regulation. Currently the regulation provides for a limited harvest of only two trout daily, from the Opening Day of the trout season in April through September 15. The minimum size limit on trout is 229 mm (9 in), except for 3 streams (Van Campens Brook, Pequannock River, and Wanaque River) that produce large Brown Trout where the Brown Trout harvested must be at least 305 mm (12 in). Fishing gear restrictions also apply (artificials only, no bait or bait scent allowed).

Many of the streams currently designated as *WTS* are relatively small, contain limited numbers of (or no) harvestable-sized wild trout, and have limited (or no) public access. In 2014 a multi-year assessment was initiated to review the *WTS* regulation, collect and analyze data, and develop regulations that will better address recreational fishing opportunities for, and conservation needs of, the state's wild trout fisheries. This effort is being guided by a team of Bureau biologists. Fish population data were collected from streams using established sampling protocols (150 m stretch electrofished in July and August). In 2014, 46 electrofishing surveys were conducted on the 36 designated *WTS's*. (Federal Grant F-48-R, Project I)

In 2015 this assessment continued with an additional 48 electrofishing surveys conducted on 39 streams (see table below). Of these, 23 surveys were conducted on 18 current *WTS* to collect additional data for regulation development and/or as part of a stream temperature monitoring study of *Trout Production* streams (Appendix F). The remaining 25 surveys were conducted on 21 *Trout Production* streams not currently regulated as *WTS*. Most of these were selected for survey because previous fish data suggested they may be good candidates for wild trout fishing regulations. Collectively these 48 surveys produced 3,093 trout for an average of 64 trout per survey. Although most of the trout captured were wild fish, some trout were stocked fish (i.e. hatchery origin). The catch breakdown by trout species was 46% Brown Trout, 50% Brook Trout, and 4% Rainbow Trout. Brook Trout were found in 30 surveys, Brown Trout in 23 surveys, and Rainbow Trout in 14 surveys. No trout were found in two surveys (Stony Brook in Stokes State Forest and a Rockaway River tributary).

Biologist Ross Shramko at Van Campens Brook holding wild Brown Trout

Wild Brown Trout from Spring Mills Brook held by seasonal technician Ryan Preston

In addition to the survey results described above, other surveys conducted under different studies in 2015 on the Lamington (Black) River, Raritan River S/B, and Pohatcong Creek that documented wild trout also provide useful data for regulation development. Detailed results for each stream survey conducted in 2015 are provided in Appendix A. The data collected in 2014 and 2015, as well as data previously collected from streams having naturally reproducing trout populations, will be analyzed in 2016 and used in the development of special fishing regulations for wild trout.

Results of 48 electrofishing surveys conducted on 39 streams during 2015 in New Jersey as part of a statewide *Wild Trout Stream* (*WTS*) regulation assessment. The number of trout includes wild and stocked trout captured (BKT= Brook Trout; BNT=Brown Trout; RBT=Rainbow Trout).

			Number of trout				Results
Stream	County	Location	BKT	BNT	RBT	Total	page #
Upper Delaware Region (Upper Delaware & Wallkill)							
Bear Creek (*WTS*)	Warren	Rt. 613	25	0	2	27	A4
Beatty's Brook	Hunterdon	Penwell Road	54	3	0	57	A5
Beerskill Creek	Sussex	Cemetery Road	29	0	0	29	A6
Bowers Brook	Warren	Rt. 664	42	0	0	42	A10
Brass Castle Brook	Warren	Harmony-Brass Castle Rd	168	0	0	168	A11
Brass Castle Brook	Warren	Kayharts Lane	46	0	0	46	A12
Criss Brook	Sussex	Flatbrook Road	42	0	0	42	A13
Forked Brook	Sussex	Grau Road	13	0	0	13	A15
Hakihokake Creek (trib.)(Wydner)	Hunterdon	Javes Road	0	22	0	22	A17
Hances Brook (*WTS*)	Warren	Rt. 57	1	0	0	1	A18
Lopatcong Creek	Warren	Rt. 519 - Warren Co. fairground	0	42	1	43	A23
Lopatcong Creek	Warren	Lock Street	0	158	4	162	A24
Lopatcong Creek	Warren	South Main Street	0	183	1	184	A25
Mill (Clove) Brook (*WTS*)	Sussex	Rt. 23	0	3	0	3	A26
Mill (Clove) Brook (Outflow Lake Marcia) (*WTS*)	Sussex	Old Mashipacong Road	6	0	0	6	A27
Mine Brook	Morris	Drakestown Road, upstream	12	0	0	12	A29
Parker Brook (*WTS*)	Sussex	Crigger Rd Bridge (Stokes SF)	2	0	0	2	A34
Spring Mills Brook	Hunterdon	Rt. 519 (behind ice cream stand)	0	160	0	160	A49
Stephensburg Brook (*WTS*)	Morris	Stephensburg Road	46	16	0	62	A50
Stony Brook (*WTS*)	Sussex	Kittle Road & Coursen Road	0	0	0	0	A51
Stony Brook (*WTS*)	Sussex	Kittle Road	4	0	0	4	A52
Van Campens Brook (*WTS*)	Warren	Blairstown-Millbrook Road	59	0	19	78	A53
Van Campens Brook (*WTS*)	Warren	Watergate Rec Area	13	0	4	17	A54
Van Campens Brook (*WTS*)	Warren	Van Campens Glen	0	28	0	28	A55
Van Campens Brook (*WTS*)	Warren	Depew Rec. Area	1	45	0	46	A56

Passaic Region (Passaic, Hackensack, & Hudson) and Upper Atlantic							
Bear Swamp Brook (*WTS*)	Bergen	Bear Swamp Road	28	0	0	28	A58
Hibernia Bk (trib.)(Lk Ames)	Morris	Snake Hill Road	68	0	0	68	A60
Indian Grove Brook (*WTS*)	Somerset	Hardscrabble Road	0	0	29	29	A61
Mill Brook (Morris)	Morris	Fords Road	0	137	0	137	A62
Passaic River (*WTS*)	Somerset	Upstream of confluence with Indian Grove Brook	0	32	31	63	A63
Pequannock River (trib.) (Copperas Mtn.)	Morris	Green Pond Road	114	6	0	120	A64
Primrose Brook	Morris	Morristown NHP	108	0	0	108	A65
Rockaway River (trib.)(West Longwood Lake)	Morris	Paderewski Road	0	0	0	0	A66
Raritan Region (Raritan, Arthur Kill, Raritan Bay, Shrewsbury, & Navesink)							
Beaver Brook	Hunterdon	Old Highway 22	0	25	4	29	A67
Black Brook (*WTS*)	Hunterdon	Van Syckels Road	0	11	0	11	A71
Hickory Run (*WTS*)	Hunterdon	Hickory Run Road	198	0	0	198	A72
India Brook	Morris	Mountainside Road	0	75	2	77	A73
Mulhockaway Creek	Hunterdon	Norton Rd-Charleston Road	2	12	1	15	A76
Raritan River N/B	Morris	Roxiticus Road	0	87	7	94	A78
Raritan River N/B	Morris	Mosle Road	0	15	4	19	A79
Raritan River S/B (trib.) (Drakestown)	Morris	Joy Drive	110	0	0	110	A89
Raritan River S/B (trib.) SW of Budd Lake)	Morris	Route 46	24	0	0	24	A90
Rinehart Brook (*WTS*)	Morris	Hacklebarney State Park	0	94	0	94	A93
Rocky Run (*WTS*)	Hunterdon	Rocky Run Road	81	0	0	81	A94
Stony Brook (*WTS*)	Morris	Columbia Trail	9	181	2	192	A95
Trout Brook (*WTS*)	Morris	Hacklebarney SP	194	0	0	194	A97
Turkey Brook (*WTS*)	Morris	Stephens Mill Road	49	50	0	99	A98
Willhoughby Brook (*WTS*)	Hunterdon	Rt. 31	5	44	0	49	A99

Willoughby Brook (Hunterdon), regulated as a Wild Trout Stream

Conservation and Restoration of Fish Habitat and Technical Assistance: Cold Water

To protect New Jersey's critical aquatic resources, fisheries biologists provide technical assistance to conservation, stream restoration, dam removal, and related Land Use projects each year. Land Use projects are coordinated through the Division's Environmental Review program. This input is directed towards minimizing land use change impacts to the state's fisheries resources. This is typically accomplished through the use of timing restrictions during critical fish spawning periods, protection of riparian buffers, and project modification, assuring best use practices are implemented at all times. However, at times a more in depth review and comments are necessary on specific projects.

In 2015 staff provided technical assistance to the following projects related to our coldwater resources:

Eastern Brook Trout Joint Venture (EBTJV)- The EBTJV is a geographically focused, locally driven, and scientifically based effort to protect, restore and enhance aquatic habitat throughout the range of the eastern Brook Trout. The EBTJV has produced a range-wide population assessment of wild Brook Trout; completed extensive work that identifies key threats to wild Brook Trout and their habitats; and developed conservation strategies to protect, enhance and restore wild Brook Trout. The EBTJV is recently completed refinements of the sub-watershed status map to the catchment scale by modeling present and historical trout data collected by state agencies and to determine and predict where trout species, especially brook trout, can be found. NJDFW biologists received the new data from the EBTJV algorithm and validated over two thousand catchments to test the model. On several occasions, the EBTJV model used stocked trout as wild trout and predicted wild trout to be found in areas of the state that only stocked trout are found. NJDFW biologists made corrections to the data and re-submitted the corrected catchment information to the EBTJV. This information will be used to assist biologists and conservationists on where to focus Brook Trout restoration efforts and where to allocate resources in the most efficient and beneficial areas for Brook Trout conservation. (Federal Grant F-48-R, Project II)

Hakihokake Creek- On on-site meeting was held along Hakihokake Creek (Hunterdon) to inspect and discuss a potential stream restoration project. Representatives present also included Trout Unlimited (TU) and the US Fish and Wildlife Service (USFWS). During the flooding events associated with Hurricane Irene and Tropical Storm Lee in 2011 this *Trout Production* stream cut a new channel in the floodplain as it flowed through the town of Milford. The local residents engaged TU to explore the possibility of restoring the stream back to its original channel, which formerly flowed in front of residences. Although algae covering submerged rocks suggested prolonged exposure to sunlight and/or possible nutrient loading issues, good pool-riffle fish habitat, channel substrate, and riparian vegetation were observed in/along the new channel. It is unlikely that restoring the creek to its former channel would enhance habitat for wild Brook Trout, as a reproducing Brown Trout population is well-established in this creek. (Hunter & Angler Fund)

Sparta Glen Brook- The Sparta Glen Brook Restoration Project aims to restore a section of Sparta Glen Brook that was devastated by a massive landslide from a microburst in August of 2000 that dumped 16 inches of rain in a very short period of time. After a partial rebuild, the site again was severely damaged by Hurricane Irene in 2011. The Fred S. Burroughs North Jersey Chapter of Trout Unlimited has partnered with the Township of Sparta to restore this section of stream back into its natural state. An electrofishing survey was done this year to determine the status of the fish population and wild Brook Trout population in this stream prior to restoration efforts. Two adult/juvenile wild Brook Trout and one young-of-the-year (YOY) wild Brook Trout were found. The YOY trout was found outside of the standard 150m sampling area. This indicates that the stream section still supports wild Brook Trout reproduction, but that the population is struggling. This area was sampled after the initial rain event in 2001 and again in 2009, both produced similar wild Brook Trout numbers to this year's survey (6 in 2001 & 2 in 2009). Another survey was done in 2001 upstream of the location affected by the landslide and 30 Brook Trout (10 YOY) were found. This 2001 survey shows that the stream can support a relatively large Brook Trout population in the landslide affected area if habitat conditions were to improve to a pre-landslide level. Overall, the survey found 443 individual fish representing 4 different species. The restoration efforts are needed and hopefully will stabilize the population. Additional information is compiled in Appendix A (page A48). (Federal Grant F-48-R, Project II)

One of two Brook Trout captured within the 150 m survey on Sparta Glen Brook

Musconetcong River- An evaluation of a fish habitat improvement project along the Musconetcong River near Point Mountain was conducted by means of electrofishing to assess the fishery following completion of an extensive in-stream fish habitat improvement project in June of 2015. A crew of 10-12 people and three backpack electrofishers were used to sample two 150 meter stream reaches. A variety of fish species were collected, including Brook Trout, Brown Trout, Smallmouth Bass, Rock Bass, Redbreast Sunfish, Bluegill, Blacknose and Longnose Dace, Tessellated Darter, Margined Madtom, Cutlip Minnow, Common Shiner, White Sucker, Walleye, and American Eel Appendix A (pages A30-A31). The species collected were, for the most part, representative of the river, but the overall number of fish collected was quite low. Although flow was significantly lower than normal for this time of year, it was still difficult to effectively sample the fish population and net fish due to water velocity, pool depth, and river width. The newly constructed pools in the sections surveyed should provide excellent deep water habitat for fishes such as trout, suckers, bass, and sunfish. However, this could not be confirmed as these pools are so deep and wide they can not be effectively electrofished (fish can easily elude capture). Worth noting was the capture of four wild trout (three Brook and one Brown Trout) in the section surveyed below the Point Mountain Road bridge, and one Walleye (4.4 inches) above the bridge. It is likely the Walleye may have escaped from the Hackettstown State Fish Hatchery or Lake Hopatcong, but it is possible that adult fish are successfully reproducing in the river. (Federal Grant F-48-R, Project II)

Fish habitat improvement project in the Point Mountain Year Round Trout Conservation Area section of the Musconetcong River during construction (left) and after completion (right).

West Portal Creek- A stream restoration project along West Portal Creek, which was funded through an NRCS *EQUIP* grant applied for by the private landowner (farmer), was conducted this spring. This small *Trout Production* stream in Hunterdon County flows through farmland before entering the Musconetcong River. It has a well-established wild Brown Trout population in the lower reach and historically wild Brook Trout inhabited the headwaters. The project site was inspected during construction to observe the progress. A stream restoration expert used an excavator to enhanced in-stream fish habitat by constructing pools, runs, and biologically productive riffles. This location was subsequently electrofished in August and 24 wild Brown Trout (no Brook Trout) were documented. Appendix A (page A57) and will be surveyed in the future to assess changes in the trout population (species, abundance, and size structure). (Federal Grant F-48-R, Project II)

COOLWATER / WARMWATER FISHERIES

Coastal Lakes Monitoring - Hurricane Sandy

In 2012, twelve freshwater coastal lakes suffered the wrath of Hurricane Sandy as record setting high tides inundated these freshwater systems with saltwater, sediment and debris. Lake Takanassee in Long Branch was hit the hardest. The outlet structure separating this freshwater impoundment from the ocean failed; what little was left is directly open to the ocean. As the timeframe for rebuilding is uncertain, it has been removed from NJDFW'strout stocking program. In its place, Franklin Lake, West Long Branch was stocked with trout. (Hunter & Angler Fund)

Silver Lake, Bradley Beach after Hurricane Sandy

The 11 other waterbodies; Carteret Park Pond (Carteret), Deal Lake (Asbury Park), Fletcher Lake (Asbury Park), Hooks Creek Lake in Cheesequake St. Park (Matawan), Indian Lake (Little Ferry), Como (Spring Lake), Lake of The Lillies (Pt. Pleasant), Silver Lake (Bradley Beach), Sunset Lake (Asbury Park), Sylvan Lake (Bradley Beach), and Wesley Lake (Asbury Park) all experienced freshwater fish kills due to saltwater intrusion with salinities ranging from 0.20 to 11.8. The salinity of freshwater is usually less than 0.5 parts per thousand (ppt). Water between 0.5 ppt and 17 ppt is considered brackish and the average ocean salinity is 35 ppt.

Fortunately, abundant spring rains in 2013 greatly assisted the recovery of several waters. Follow-up measurements taken in June 2013 showed considerable improvements in salinity levels with seven lakes dropping below 0.5 ppt. In 2013, Deal Lake, Sunset Lake, and Lake of the Lillies were able to be restocked. In 2014, salinity checks were conducted at Silver Lake, Lake Como, Spring Lake, and Wesley Lake. All were found to have recovered from Hurricane Sandy were stocked with warmwater fish.

Carteret Park Pond- Carteret Park Pond was intentionally drawn down, so that it could be flushed with freshwater supplied by municipal water and has been monitored since. Water quality data was collected and salinity levels have returned to near-normal levels of 0.26 ppt in 2014. Observations of fish included approximately 30 to 40 five-inch Largemouth Bass plus young-of-the-year (YOY), 100 adult sunfish plus YOY, and 3 adult bullheads. Additional fish were eventually stocked by the Hackettstown State Fish Hatchery, including Largemouth Bass, Channel Catfish, and sunfish.

Hooks Creek Lake- Hooks Creek Lake in Cheesequake State Park did not fare as well. Although salinity dropped from 11.8 ppt in January of 2013, to 9.6 ppt in June of 2013, it remained elevated at 3.8 ppt as of June 1, 2014. Species encountered during seining include Mummichog, Banded Killifish, Inland Silverside, White Perch, and Gizzard Shad. In 2015, monitoring determined that Hooks Creek Lake salinity levels had dropped to 1.12 ppt., which

allowed the stocking of Largemouth Bass, sunfish, Brown Bullheads, and Channel Catfish. Rainbow Trout were stocked in the fall of 2015.

Indian Lake- As first reported by an angler in 2015, Indian Lake (6 acres) in Little Ferry, Bergen County was also apparently impacted by Hurricane Sandy, as indicated by a reported fish kill immediately following the weather event. In response, reproductive check was conducted on July 28th, 2015. This lake is stocked with trout during the spring, and as expected, none were collected during this survey. The warmwater fish assemblage consisted of six species, including low numbers of Largemouth Bass and Black Crappies, indicating that perhaps a fish kill did take place as a result on Hurricane Sandy, although it was never reported at that time. Salinity (1.13 ppt) was acceptable to restock freshwater fish and as a result the Hackettstown State Fish Hatchery will stock Largemouth Bass, Bluegill, and Brown Bullheads in spring 2016.

Although the effects of Hurricane Sandy will have lasting impacts on many residents of New Jersey for many years to come, the current status of eleven of the twelve freshwater lakes impacted by this extreme weather event (all but Lake Takanassee) are on there way to a full recovery, as salinity levels have returned to suitable levels to support freshwater fish populations.

Coolwater Fisheries Assessment

The Coolwater Fisheries Assessment was initiated in 2013 to assess coolwater fisheries that are maintained by annual stockings (Muskellunge, Northern Pike, Walleye, and Hybrid Striped Bass) from the Hackettstown State Fish Hatchery. In 2013 the focus was on developing sampling techniques and protocols for assessing Muskellunge, which are stocked in ten waterbodies statewide. Three of these lakes (Carnegie Lake, Furnace Lake, and Mountain Lake) were selected for sampling in 2013 using trap nets during the spring when mature muskies congregate for spawning and are more vulnerable to capture. In 2014, the second year of the Coolwater Assessment, four waterbodies (Farrington Lake, Lake Hopatcong, Monksville Reservoir, and Pompton Lake) were selected for spring trap netting surveys to assess one or more species (Northern Pike/Muskellunge/Walleye). (Federal Grant F-48-R, Project I)

In 2015 seven waterbodies were sampled (Canistear Reservoir, Furnace Lake, Manasquan Reservoir, Mercer Lake, Monksville Reservoir, Spruce Run Reservoir, and Swartswood Lake). A total of 73 trap nets, 9 overnight gill net sets, and 5 nights of boat electrofishing were utilized to capture the target species of interest from each waterbody. Trap net sampling for Muskies and Pike, delayed by late ice-out, commenced in early April, multiple nighttime boat electrofishing surveys were conducted in the fall to target Walleye, and gill nets were set in the fall to target Hybrid Striped Bass. The results from these surveys are summarized below by waterbody (see table below) and are presented in the complete report with greater detail in Appendix G.

Canistear Reservoir- At Canistear Reservoir Walleye were targeted during fall nighttime electrofishing. On October 13 a total of 21 Walleye, 67 Smallmouth Bass, and 13 Largemouth Bass were captured over 1.2 hrs of electrofishing. Smallmouth Bass were found to be most abundant (CPUE of 42 fish/hr). The Walleye population was only moderately abundant with a CPUE of 8 fish/hr, another example of low CPUE during fall nighttime electrofishing for Walleye. Of those Walleye captured, most were larger individuals indicated by a PSD of 80 and RSD_p of 30. The Walleye population will continue to be monitored at this reservoir to obtain more data.

Furnace Lake- Furnace Lake, a 53 acre lake located in Oxford-Furnace Township, was sampled for Muskellunge using trap nets between April 22nd and April 24th. A total of 9 trap nets were set and 3 Muskellunge and 1 Tiger Muskellunge were captured. They ranged in size from 33– 42 in. and 8.0–25.4 lbs. respectively (see photo). This catch rate is almost double the standard used in Pennsylvania for a good Muskellunge fishery (1 Muskellunge for every 4 trap nets) and indicates an abundant population of Muskellunge. Anglers actively fishing when crews were present indicated that they catch Muskellunge with regularity at Furnace Lake and it is not unusual to catch three in one day, which is an extremely good catch rate for Muskellunge using hook and line.

Biologist Scott Collenburg with Furnace Lake Muskie

Manasquan Reservoir- At Manasquan Reservoir the target species for trap netting was Muskellunge and the catch was low. Only one individual was captured (CPUE of 0.1 fish/net). The Muskellunge was large at 963 mm (38 in) and weighed 8 kg (17.6 lb). Manasquan Reservoir proved difficult to sample as it lacks a variety of points and inlets that trap nets are set to capture Muskellunge. Hybrid Striped Bass are also stocked annually in the reservoir and to assess this fishery, a total of four 120 ft experimental gill nets were set between October 21 and 22. A total of 3 Hybrid Striped Bass were captured during this sampling. Because of this low catch rate, additional sampling is scheduled fall of 2016 to determine the status of this fishery.

Manasquan Reservoir Hybrid Striped Bass held by biologist Scott Collenburg

Mercer Lake- A total of 6,247 fish were captured in the trap nets at Mercer Lake. White Perch were the most common fish species present, composing 91.2% of the catch. A total of twelve species of fish were collected during this trap net survey. The target species, Muskellunge, was not captured during the survey. This is an indication that population abundance is low.

Monksville Reservoir- At Monksville Reservoir the target species for trap netting were Walleye and Muskellunge. Walleye were found to be fairly abundant (41 total) with a CPUE of 2.6 fish/net. Pennsylvania Fish and Boat Commission developed trap net standards for medium sized reservoirs (50-500 acres) which are 4.8 Walleye/net during the early spring and 1.8 Walleye/net post spawn. The timing of trap netting coincided with the tail end of spawning and this resulted in a reduced catch rate. The Walleye captured were composed of mostly larger individuals indicated by a PSD of 85, RSD_p of 75, and RSD_m of 50, but there were a good number of individuals representing a variety of age classes. The relative weight (W_r) metric indicated Walleye were in below average condition (average W_r of 90 ± 3), but this condition is expected for post spawn fish.

Biologist Ross Shramko with 28.5 in. / 9.5 lb. Walleye from Monksville Reservoir

46.9 in. and 29 lb. Muskie from Monksville Reservoir

Muskellunge were also targeted at Monksville Reservoir and found to be fairly abundant (4 total caught) with a CPUE of 0.3 fish/net. Pennsylvania Fish and Boat Commission developed trap net standards for capturing Muskellunge via trap nets in which a

quality Muskellunge fishery will encounter 0.25 Muskellunge/trap net (1 Muskellunge for every 4 nets set). Applying this standard to our catch rate, Monksville Reservoir has a quality Muskellunge fishery. The sizes of Muskellunge captured were composed of larger individuals indicated by a PSD of 75, RSD_p of 75, and RSD_m of 50. The relative weight (W_r) metric indicates the Muskellunge were in slightly below average condition (mean W_r of 94 ± 7) also.

Walleye were also sampled by nighttime electrofishing. During this electrofishing effort, which lasted 1.76 hrs, no Walleye were captured. Historically, sampling at Monksville Reservoir shows that timing of sampling can play a large role in the success of catching the target species with more success for Walleye occurring later in October. Night electrofishing this fall for Walleye was, in general, unsuccessful for all waterbodies sampled.

Spruce Run Reservoir- At Spruce Run Reservoir the target species for trap netting was Northern Pike and the catch of Northern Pike was high (CPUE of 5.1fish/net). A total of 82 Northern Pike were captured and they ranged from 390 – 926 mm (15.4 – 36.5 in) long and 0.37 – 6.58 kg (0.82 – 14.5 lb). Of the Northern Pike captured, the majority were larger individuals (indicated by a PSD of 96 and RSD_p of 26), with 59 exceeding the legal size of 24 inches and 27 exceeding a quality size of 30 inches. The condition of Northern Pike was measured using a relative weight metric (W_r). The overall mean W_r for Northern Pike collected was 93 ± 3 and ranged from 67 – 122 which indicates overall condition slightly below average. Hybrid Striped Bass are also stocked annually in this reservoir and to assess this fishery five 120 ft experimental gill nets were set between October 14 and 15. A total of 47 Hybrid Striped Bass were captured representing all size ranges, but most were larger individuals as indicated by the PSD of 93, RSD_p 64, and RSD_m 18. The Hybrid Striped Bass fishery in this waterbody appears to be healthy and stable.

Biologist Shawn Crouse with 30.1 in. / 7.3 lb. Northern Pike from Spruce Run Reservoir

Swartswood Lake- At Swartswood Lake the target species for spring nighttime electrofishing was Walleye. A total of 3 hours of electrofishing was conducted between two nights in the spring (May 21 and June 2) and Walleye were found to be most abundant species in the lake(CPUE of 15 fish/hr). The Walleye population was represented by mostly larger individuals indicated by a PSD of 85 and RSD_p of 43 and the relative weight (W_r) index indicated Walleye were in good condition (average W_r of 100 ± 3). Additional sampling conducted in the fall (October 20th) via nighttime boat electrofishing was not as successful with only 11 Walleye being captured in 1.8 hrs of sampling.

Swartswood Lake Walleye

Comparison of catch per unit effort (CPUE) and stock density indices for coolwater fish species captured by spring trap netting, night electrofishing, and fall gill netting various waterbodies in 2014 and 2015.

Species	Number	% of Captured	Nets Set	CPUE	PSD	95% CI (+/-)	RDS_P	RDS_m
2014 – Trap netting								
Lake Hopatcong								
Walleye	71	1.2	29	2.45	100	1	86	23
Muskellunge	10	0.2	29	0.34	100	10	100	40
Farrington Lake								
Northern Pike	7	0.2	16	0.44	86	44	71	14
Pompton Lake								
Northern Pike	3	0.1	8	0.38	-	-	-	-
Monksville Reservoir								
Walleye	2	0.1	16	0.13	-	-	-	-
Muskellunge	2	0.1	16	0.13	-	-	-	-
2015 – Trap netting								
Spruce Run Reservoir								
Northern Pike	82	6.9	16	5.1	96	6	26	2
Manasquan Reservoir								
Muskellunge	1	0	16	0.1	-	-	-	-
Furnace Lake								
Muskellunge	4	0.1	9	0.4	-	-	-	-
Mercer Lake								
Muskellunge	0	0	16	0	-	-	-	-
Monksville Reservoir								
Walleye	41	2.4	16	2.6	85	14	75	50
Muskellunge	4	0.2	16	0.3	-	-	-	-
2015 - Fall Gill nets								
Spruce Run Reservoir								
Hybrid Striped Bass	47	-	5	-	93	10	64	18
Manasquan Reservoir								
Hybrid Striped Bass	3	-	4	0.75	-	-	-	-
2015 - Nighttime electrofishing			Hours					
Swartswood Lake - Spring								
Walleye	46 > stock	50.5	3	15	85	13	43	2
Canistear Reservoir - Fall								
Walleye	10 > stock	20.8	1.2	8	80	38	30	0
Swartswood Lake - Fall								
Walleye	8 > stock	19.6	1.8	4	100	13	50	0
Monksville Reservoir - Fall								
Walleye	0	0	1.76	0	-	-	-	-
Muskellunge	1 > stock	0	1.76	1	-	-	-	-

General Fisheries Surveys

Northern Pike Electrofishing Surveys on Passaic River

Beginning in the year 2000, the Passaic River has received 2,200 six-inch fingerling Northern Pike, annually. It also receives additional surplus pike, ranging in size from two to four inches. The pike are stocked at more than 25 locations from the Lower Chatham Bridge at the Morris-Essex County line to Pennington Park in Paterson. Locations from Hawthorne to Garfield, above the Dundee Dam on the Bergen County side of the river, are also stocked. This fishery has become very popular, with anglers reporting pike weighing up to 20 pounds and measuring in the low 40-inch range. Sampling was conducted in 2015 to quantify the pike's population in the river. The below three sampling sites were chosen for their access (boat ramp) and will be resampled in future years.

Passaic River (Morris) – A boat electrofishing (0.53 hours) survey was conducted on the Passaic River, Florham Park on October 6th. The fish assemblage consisted of five species including Northern Pike (3), Black Crappie (1), Yellow Perch (75), Common Carp (50), and Golden Shiner (65). Noticeably absent were sunfish and White Suckers. The relative weights (58, 62, and 79) of the three Northern Pike collected indicate that they were under weight for their length. It is recommended that additional electrofishing should be conducted.

Passaic River (Essex) – A boat electrofishing (0.86 hours) survey was conducted on the Passaic River, Fairfield on October 6th. The fish assemblage consisted of five species including Northern Pike (2 observed), Brown Bullhead (2), Common Carp (3), Yellow Perch (6), and White Suckers (10). The Northern Pike appeared underweight for their length. The lack of forage fish in general and the absence of sunfish were notable. It is recommended that additional electrofishing should be conducted.

Passaic River (Passaic) – A boat electrofishing (1.12 hours) survey was conducted on the Passaic River, Elmwood Park on October 22nd. The fish assemblage consisted of nine species including Brown Bullhead (25), Common Carp (4), Yellow Perch (35), Largemouth Bass (7), Smallmouth Bass (10), Creek Chubs (27), American Eel (15), Bluegill (1), and Pumpkinseed (1). A boat angler returning to the boat ramp from downstream caught two Smallmouth Bass, one Largemouth Bass, and two Northern Pike at the Rt. 46 Bridge. It is recommended that additional electrofishing should be conducted.

Lake Inventories

Successful management of New Jersey's warm and cool water fisheries resource is based upon specific knowledge of their physical, chemical, biological, and use characteristics. Such knowledge may serve to direct immediate management recommendations or be used as a baseline, upon which to recognize future changes, requiring remedial management efforts. Under this activity physical, chemical, and biological data is collected utilizing standard sampling techniques. Physical parameters include morphometry, bathymetry, access, watershed, and aquatic vegetation characteristics. Chemical parameters include general water chemistry and sediment nutrient characteristics. Biological parameters include fish species composition, abundance (catch-per-unit-effort), length frequency distribution, and calculated indices of population structure and dynamics such as proportional stock density (PSD), relative weight (W_r), age, and growth. The data are analyzed and results are used to develop management recommendations and prepare an individualized fisheries management plan for the waterbody. These plans are summarized and published for dissemination to the angling public. (Federal Grant F-48-R, Project I)

Lake Inventory: Union Lake

In 2015 a lake inventory was conducted on Union Lake, situated in Millville, Cumberland County. This lake is an impoundment on the Maurice River and is the largest lake in southern New Jersey, having a surface area of 898 acres, a maximum depth of approximately 27 feet, and an average depth of 9 feet. The shoreline of Union Lake is relatively undeveloped and bordered by a Wildlife Management Area on the western shoreline and private residences along the eastern shoreline. Union Lake is one of the most popular fishing locations in South Jersey due in part to its size and the ability to utilize gasoline powered outboard motors. Boaters are restricted to outboards less than 10 hp. There are two public boats ramps; one maintained by NJDFW with a concrete ramp and paved parking areas the other owned by the City of Millville with a concrete ramp and unpaved parking area.

Materials and Methods

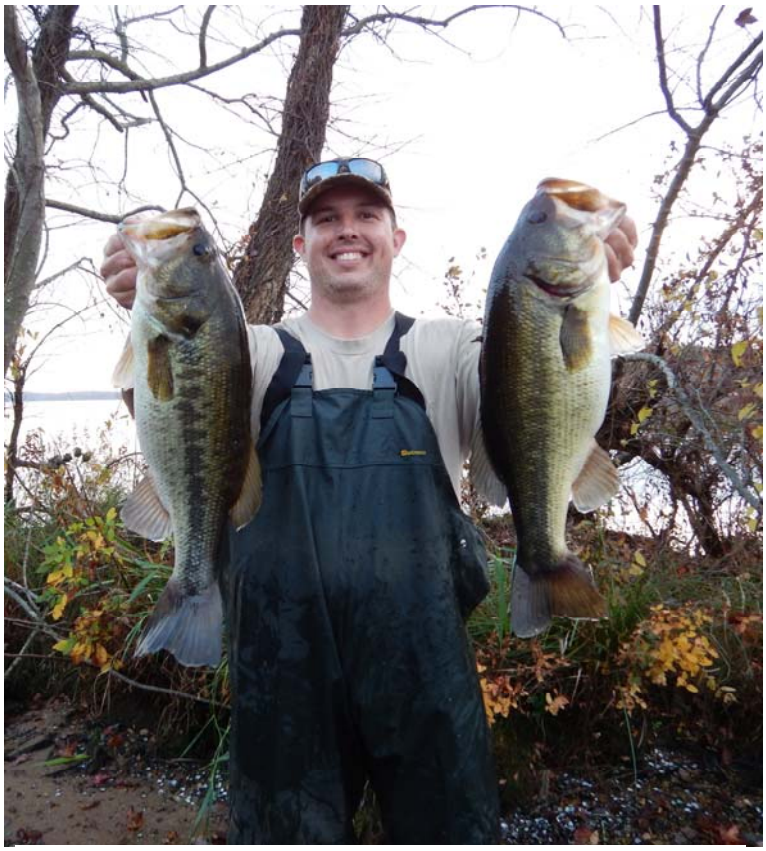
Water quality parameters were measured in the lake at various locations. Dissolved oxygen, conductivity, pH, and temperature were measured in the field using hand held Yellow Springs Instrument (YSI) meter (Professional Plus model).

A 13.2 Smith-Root electrofishing boat was used during all electrofishing-sampling periods. A total of six electrofishing surveys were completed at Union Lake during the 2015 sampling period, of which four were conducted at night. Night surveys were completed in the spring (May 12 and June 3) and in the fall (October 21 and October 26). Two daytime surveys were also completed, one on August 13 and one on November 5. The daytime electrofishing surveys primarily targeted Largemouth Bass. All species encountered during night electrofishing were collected. A total of 76 locations were sampled by shoreline seining on June 23rd, June 25th, and July 23rd. Three experimental gill nets were set at locations throughout the lake on November 4th.

Length and weight measurements were taken on all game and panfish species collected. Proportional stock densities (PSD), relative stock densities (RSD), and relative weights (W_r) were calculated for Largemouth Bass, Smallmouth Bass, Chain Pickerel, Bluegill, Pumpkinseed, Yellow Perch, White Perch, and Black Crappie. Scales were removed from a sub-sample of all gamefish species, and later mounted between two glass slides, viewed using a microfiche projector, and aged. Back-calculation was used to obtain information on the growth history of year classes of Largemouth Bass, Smallmouth Bass, Bluegill, Pumpkinseed, Yellow Perch, Black Crappie, and Chain Pickerel.

Fisheries Results

Union Lake has one the highest species diversities in the state. Twenty-five species, representing thirteen families and ten orders were collected during 2015 sampling. Many of the species have been introduced for recreational purposes, however, a few of New Jersey's less common native species (i.e. Bluespotted Sunfish, Pirate Perch, and Swamp Darter) also inhabit these waters. The most abundant species collected during seining was Largemouth Bass, representing 22% of the total catch. Largemouth Bass were also the most abundant game species collected during electrofishing. Panfish (Bluegill, Yellow Perch, and White Perch) were found in similar abundance during electrofishing surveys. Complete results of the inventory can be found in Appendix I (Union Lake Fisheries Management Plan).



Assistant Biologist Eric Boehm with
two Largemouth Bass from Union Lake

Warmwater Electrofishing Assessment

New Jersey has over 400 impoundments open to the general public for fishing and thousands more in private ownership scattered throughout the state. These lentic environments offer excellent fishing opportunities for a variety of species such as bass, sunfish, crappie, and pickerel. These species naturally reproduce in the waterways and often do not require active stocking to sustain their populations. The Bureau of Freshwater Fisheries conducts abbreviated fisheries surveys on lakes and ponds throughout the state to assess the status of popular game species, compared to full inventories on others. Electrofishing surveys are conducted at various waterbodies throughout the state to assess the current status of the bass populations. Sampling results are used to determine if supplemental stockings or adjustments to current regulations are necessary. Twenty-seven surveys were conducted in 2015. Assunpink Lake had the highest CPUE for Largemouth Bass at 33 bass/hour during daytime electrofishing. The two largest bass encountered during sampling were also collected at Assunpink Lake. Additional stocking of warmwater fish is required at six of the waterbodies sampled 2015. Additional sampling is needed at thirteen of those locations. (Hunter & Angler Fund)

Alcyon Lake (Gloucester) - A boat electrofishing survey was completed at the Alcyon Lake (18 acres) on July 24th to evaluate the Largemouth Bass population. The lake has a persistent abundance of aquatic vegetation that lake owners have attempted to control through winter lowering. The lowerings have been unsuccessful and alternate methods, including herbicides, are being considered. A total of 35 Largemouth Bass were collected in 1.05 hours of electrofishing, of which 30 were greater than the 200 mm stock size, resulting in a CPUE of 28 bass/hour. The PSD was 60 and RSD_{15} was 22, indicating the population is balanced. Despite having a balanced Largemouth Bass population, a large number of undesirable rough fish were observed including Common Carp and White Suckers. Both species were observed to be abundant and rather large. Removal of these species should be considered to allow more desirable game species to flourish. Additional stocking of Largemouth Bass, Bluegill, and Black Crappie should be considered in 2016.

Assunpink Lake (Monmouth) – Assunpink Lake is one of five lakes managed under the Lunker Bass Program and one of the most utilized Wildlife Management Areas in the state. A boat electrofishing survey was completed at Assunpink Lake (225 acres) on July 9th to evaluate the Largemouth Bass population. A total of 47 Largemouth Bass were collected during 1.02 hours of electrofishing. Thirty-four individuals were greater than the 200 mm stock size, resulting in a CPUE of 33 bass/hour. The PSD was 47 and RSD_{15} was 23 indicating the population is balanced. The two largest bass collected were 558 mm (22.0 in) and 550 mm (21.7 in) and weighed 3.02 kg (6.66 lbs.) and 2.91 kg (6.42 lbs.). Additional stocking of Largemouth Bass is recommended in 2017.

6.66 lb. Largemouth Bass from Assunpink Lake held by Biologist

Budd Lake (Morris) – Budd Lake, a 374 acre natural lake, is situated in the headwaters of the South Branch of the Raritan River and can support a variety of wetland and aquatic plants. A daytime boat electrofishing survey was conducted on July 17th. At an average of 6-8 feet of depth and being heavily vegetated, fish kills occur with regularity. Jan Lovy, Fish Pathologist with the Division of Fish and Wildlife, reported that, similar to the fish kill in Hyper Humus (page 72), it is likely that the kill was attributed to winter kill caused by the lake being ice and snow covered over for an extended period, preventing photosynthesis. It appears that a considerable number of large Northern Pike were impacted in this kill based on several reports from residents of hundreds of dead pike." In addition, State Fish Hatchery's annual trap netting for Northern Pike broodstock, which is typically successful in capturing high numbers was atypically low in 2015. The electrofishing survey lasted 1.50 hours and a total of 9 Largemouth Bass were captured ranging from 66 – 454 mm (2.6 – 17.9 in) in length (8 of which were ≥ 200 mm), had a PSD of 38, and a CPUE of 5 bass/hr. The PSD indicates the population is composed of smaller individuals, but for a shallow lake with habitat located throughout it appears the abundance of bass is moderate when compared to surveys that were last done in 1987 and 1989. A total of 8 Northern Pike were captured ranging from 182 – 791 mm (7.2 – 31 in) in length and had a PSD of 71. In terms of catching Northern Pike via daytime boat electrofishing, catch rates are higher than when previous surveys were conducted in 1987 and 1989. The PSD also indicates the population is well balanced. Other notable species captured include Bluegill, Yellow Perch, and White Perch that were overly abundant. The results indicate that the Northern Pike population is still doing well, but the concern was not completely lifted by this sampling effort. Monitoring should continue here especially since this waterbody is a productive Northern Pike broodstock lake for the hatchery.

Clove Acres Lake (Sussex) – Clove Acres Lake (20 acres) was electrofished on July 30 with a Smith Root Electro-fishing boat to determine the status of the lake's fish population. Sampling of the lake was requested by the Town of Sussex's lake manager. The lake was lowered prior to Superstorm Sandy in 2012, but was lowered beyond the level advised for fish survival. It was thought that the fish population suffered major losses due to the lowering and the current fish population and health of the fish population was unknown. After sampling the lake on July 30, it was determined that the fishery is in good condition. Largemouth Bass in several age classes including a few fish over 3 lbs. were collected. PSD for Largemouth Bass was 65 which indicates a balanced population. Ten different species were found in the lake including Sunfish (Bluegill & Pumpkinseed), Golden Shiner, and Yellow Perch.

Seasonal Technicians Ryan Preston and Chrissy Szpond at Clove Acres Lake with Largemouth Bass

Columbia Lake (Warren) – Columbia Lake (48 acres) was electrofished on July 10 to determine the status of the fish population. The sampling was done as part of the Paulins Kill Restoration Project, which is proposing to remove the Columbia Lake Dam to restore connectivity to 10.9 stream miles. This pre-dam removal assessment of the fish population found 132 individual fish, comprised of 16 different species. Interestingly, 12 stocked Rainbow Trout and 1 stocked hybrid trout were found near a large underground spring. The underground spring provides an area of coldwater refuge from summer elevated lake temperatures. The lake temperature was 22.9 ºC while the area where the trout were found was 14.2 ºC. Not surprisingly, 0 American Shad, 0 Blueback Herring, and only 3 American Eels (0 of which were less than 200 mm) were found in Columbia Lake further indicating that the Columbia Lake Dam impedes fish movement. Other species found included Largemouth Bass, Smallmouth Bass, Bluegill, Pumpkinseed Sunfish, Redbreast Sunfish, Rock Bass, Brown Bullhead, Golden Shiner, Yellow Perch, White Sucker, and Common Carp.

Cooper River Park Lake (Camden) – A boat electrofishing survey was completed at Cooper River Park Lake (150 acres) on August 3rd to evaluate the Largemouth Bass and known invasive Northern Snakehead populations. A total of 38 Largemouth Bass were collected in 1.24 hours of electrofishing. There were 31 Largemouth Bass greater than the 200 mm stock size, resulting in a CPUE of 25 bass/hour. The PSD was 35 and RSD_{15} was19, indicating the population is unbalanced. An extensive dredging project is scheduled to begin during the fall of 2015. Stocking of additional young-of-the-year (YOY) Largemouth Bass is recommended after the dredging project is completed. Fluctuating water levels during spawning season have presumably affected reproduction. One adult Northern Snakehead measuring 600 mm (23.6 in) was collected.

Davis Mill Pond (Cumberland) – A boat electrofishing survey was completed at Davis Mill Pond (40 acres) on July 7th to evaluate the Largemouth Bass population. The lake was suspected to have been affected by Largemouth Bass Virus in recent years. Anglers reported poor fishing success in 2010, which prompted electrofishing surveys in 2011 and 2012. Electrofishing surveys confirmed that the population had been impacted. Supplemental stockings of Largemouth Bass were completed in 2013 and 2014 to enhance the population. A total of 53 Largemouth Bass were collected in 1.27 hours of electrofishing. Thirty-eight Largemouth Bass were greater than the 200 mm (8 in) stock size, resulting in a CPUE of 29 bass/hour. A total of 15 individuals were less than the stock size. The PSD was 79 and RSD_{15} was 21, indicating the population is balanced. The lake should be resampled by electrofishing in 2018 to monitor the population.

Deal Lake (Monmouth) – A boat electrofishing (0.96 hours) survey was conducted at Deal Lake (158 acres) in Asbury Park on September 23rd. Deal Lake was one of the coastal lakes that experienced a fish kill due to inundation with salt water by Hurricane Sandy in October 2012. Subsequently, after the water became fresh again, it was restocked in the fall of 2013 with Northern Pike, Largemouth Bass, Bluegill, Brown Bullheads and Channel Catfish from the Hackettstown State Fish Hatchery. Electrofishing was not possible on the northern and southern arms of the lake due to bridge construction, therefore only the middle arm of the lake was sampled. The fish assemblage consisted of 10 species including Largemouth Bass (9), Black Crappie (1), sunfish sp. (100+), Gizzard Shad (300+), Common Carp (100+), Yellow Perch (200+), White Perch (200+), Brown Bullhead (6), Alewife (15), and American Eel (16). It appears the fish population is recovering from the effects of Hurricane Sandy. It is recommended that electrofishing be repeated when the northern and southern (historically, the most productive) arms are accessible. Reproduction checks (shoreline seining) should also be conducted.

Delaware Lake (Warren) – This 36 acre lake, located within the Paulins Kill WMA near the town of Columbia, has been regulated as a Lunker Bass Lake since 2000. A boat ramp and dock are present and anglers have good shoreline access, particularly along the long, earthen spillway. On October 8, 2015 the perimeter of the lake was electrofished at night (two complete passes) to assess the bass fishery. A total of 83 Largemouth Bass were collected in 1.88 hrs. The bass ranged in size from 120 – 491 mm (4.7 – 19.3 in) and weighed 0.02 – 2.13 kg (1 oz - 4.7 lbs). Half of the bass caught (42 fish) measured 200 – 300 mm (8 – 12 in). These fish are likely among those that were stocked by the Hackettstown State Fish Hatchery in 2012 (2,000 bass, primarily fingerlings, stocked). Of the 83 bass captured, 72 were at least 200 mm (8 in) for a catch per unit effort of 38 fish/hr. PSD was 42, RSD-P was 6, and RSD-M was 0. Although the PSD indicates a balanced bass population, all values are noticeably below the accepted ranges for a "big bass" (i.e., lunker bass) lake (PSD 50–80, RSD–P 30-60, and RSD–M 10-25). When surveyed in 2001 the PSD was 38, RSD-P was 18, and RSD-M was 0. Since the lake was opened for public fishing the fishing pressure has increased and it is possible anglers are harvesting the bigger bass, especially through the ice, despite the restrictive regulation. Another electrofishing survey should be conducted in 2016 (and bass scales taken for aging purposes) to better assess the bass population dynamics before considering any fisheries management actions.

Delaware River (Camden) – A boat electrofishing survey was completed at the Delaware River near Pennsauken Creek on August 4th to evaluate the Largemouth Bass population. A total of 15 Largemouth Bass were collected in 1.05 hours of electrofishing. All individuals were greater than the 200 mm stock size. One Smallmouth Bass measuring 396 mm (15.6 in) was collected. Adult Channel Catfish were observed to be rather abundant. No additional stocking or sampling is recommended at this location.

DOD Lake (Salem) – A boat electrofishing survey was completed at DOD Lake (120 acres) on July 13th to evaluate the Largemouth Bass and invasive Northern Snakehead populations. A total of 45 Largemouth Bass were collected in 1.30 hours of electrofishing, 36 of which were greater than the 200 mm stock size. The CPUE for individuals greater than the 200 mm stock size was 27 bass/hour. The PSD was 69 and RSD_{15} was14, indicating the population is slightly unbalanced. Two Northern Snakeheads were collected, measuring 320 mm (12.6 in) and 375 mm (14.8 in). Two additional snakeheads were observed but escaped capture. Snakeheads are believed to have entered the lake through a pipe connecting directly to the Delaware River. In addition, two adult Bowfin and two adult Alewife were collected. DOD Lake has been stocked with both Muskellunge and Smallmouth Bass. Neither species were collected during sampling. The DOD Lake should only receive surplus Muskellunge and should be removed from the regular stocking list. The stocking of Smallmouth Bass should also be discontinued.

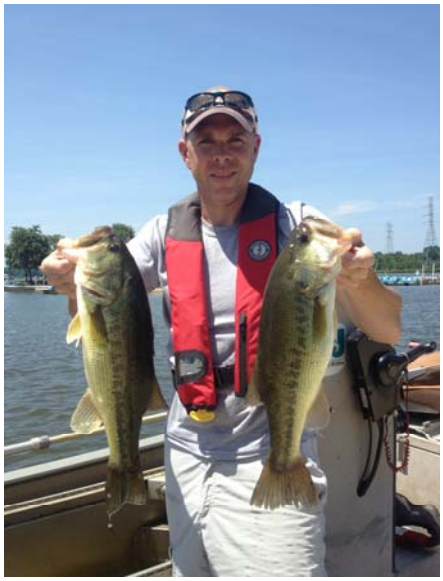
Farrington Lake (Middlesex) - A boat electrofishing survey was completed at the Farrington Lake (290 acres) on July 17th to evaluate the Largemouth Bass population. A total of 26 Largemouth Bass were collected in 1.11 hours of electrofishing. Electrofishing was restricted to the section of the lake between Church Lane and Washington Place due to the low bridges. Fifteen individuals were greater than the 200 mm (8 in) stock size. The CPUE was 13 bass/hour. The PSD was 73 and RSD_{15} was 27, indicating the population is balanced. One Channel Catfish was collected, measuring 605 mm (23.8 in) and weighing 2.52 kg (5.56 lbs). No stocking of Largemouth Bass is recommended at this time.

Green Turtle Pond (Passaic) – Green Turtle Pond, a 40 acre lake, is situated between the larger Greenwood Lake and Monksville Reservoir, all of which drain into the Wanaque River. A daytime boat electrofishing survey was conducted here on July 29th. The survey lasted 1.45 hours and a total of 58 Largemouth Bass were captured ranging from 41 – 418 mm (1.6 – 16.5 in) in length and had a PSD of 12. Of the 58 captured, 33 were larger than 200 mm (CPUE of 23 bass/hr). The population was dominated by smaller sized individuals and is out of balance. Panfish, including Bluegill, were abundant and Bluegill had a PSD of 49. Plenty of habitat and forage exists. No action needs to be taken at this time, but an additional electrofishing survey should be conducted here in the early spring or late fall of 2016 to determine additional management strategies that can be implemented, if necessary, to help restore balance to the fishery.

Manasquan Reservoir (Monmouth) – A boat electrofishing survey was completed at Manasquan Reservoir (720 acres) on August 19th to evaluate the Largemouth and Smallmouth Bass populations. A total of 18 Largemouth and 4 Smallmouth Bass were collected. The CPUE for Largemouth Bass was 15 fish/hour. The sample size was too small to calculate a CPUE for Smallmouth Bass. Two Largemouth Bass in excess of five pounds were collected weighing (2.430 and 2.640 kg) in 1.17 hours of daytime electrofishing. An additional survey should be completed at night during the spring of 2016 to further evaluate the population. Surplus Smallmouth Bass have been stocked in recent years to enhance the population and should continue to be stocked in the future.

Manasquan Reservoir Largemouth Bass held by Seasonal Technician Ryan Preston

Mercer Lake (Mercer) – A boat electrofishing survey was completed at Mercer Lake (275 acres) on July 10th to evaluate the Largemouth Bass population. Mercer Lake was impacted by Largemouth Bass Virus, however the population appears to be recovering. A total of 59 Largemouth Bass were collected during 1.61 hours of electrofishing. Twenty-six individuals were greater than the 200 mm stock size, indicating a CPUE of 16 bass/hour and 32 were less than the stock size. The PSD was 65 and RSD_{15} was 38 indicating the population is balanced. Young-of-the-year (YOY) Largemouth Bass were stocked in 2015 to enhance the population. Electrofishing should be conducted at night in 2016 and 2017 to further monitor the Largemouth Bass Population and stocking success.



Long time Seasonal Technician Scott Ward with two nice Largemouth Bass from Mercer Lake

Merrill Creek Reservoir (Warren) – This 650 acre, privately-owned reservoir is the deepest waterbody in New Jersey (64 m (210 ft)). It boasts an excellent bass fishery, dominated by Smallmouth Bass, is stocked annually with trout (currently Rainbows), and supports a reproducing Lake Trout population. Every seven years the reservoir's owner and their aquatic consultant electrofish the shoreline to assess the warmwater fishery, and in particular, the black bass population. This assessment, consisting of one hour of night electrofishing, at each of four stations, was conducted on May 20, 2015. NJDFW participated in this survey and highlights of the data collected are summarized here. Twelve fish species captured, ranked by abundance include: Bluegill, Redbreast Sunfish, Smallmouth Bass (SMB), Largemouth Bass (LMB), Rock Bass, Pumpkinseed, Yellow Perch, Rainbow Trout, Chain Pickerel, Common Carp, Black Crappie, and Lake Trout. A total of 159 black bass (95 SMB and 64 LMB) were collected, measured, and weighed. The bass ranged in size from 120–491 mm (4.7–19.3 in) and weighed 0.02–2.13 kg (1 oz to 4.7 lbs). Scale samples were taken from a subset of bass, for age and growth determination. Of the bass collected, 112 bass (61 SMB; 51 LMB) were minimum stock size (at least 180 mm (7 in) for SMB and 200 mm (8 in) for LMB); the CPUE was 28 bass/hr (15 SMB/hr, 13 LMB/hr). The PSD, RSD-P, and RSD-M for bass were as follows:

Smallmouth Bass (SMB)		
PSD (Quality) > 280 mm (11 in)	RSD-P (Preferred) > 350 mm (14 in)	RSD-M (Memorable) > 430 mm (17 in)
67	48	24

Largemouth Bass (LMB)		
PSD (Quality) > 300 mm (12 in)	RSD-P (Preferred) > 380 mm (15 in)	RSD-M (Memorable) > 510 mm (20 in)
63	35	4

The PSD and RSD values provide insight about the bass population dynamics. The bass population is considered "balanced" (PSD's 40-70). In addition, the SMB population met the criteria for management under the "big bass" option established by Willis et al. (1993): PSD 50–80, RSD–P 30-60, and RSD–M 10-25. This data, and data from past surveys, has consistently shown the reservoir to have a good Smallmouth Bass fishery. This reservoir may be a good candidate for lunker (trophy) bass regulations. The fisheries data collected will be further analyzed by the consultant, and the results will be jointly reviewed by NJDFW and reservoir staff, and used to manage the reservoir's fishery.

Mullica Hill Pond (Gloucester) - Township officials requested an evaluation of the fish population following a dam repair project that was completed in spring of 2015. A boat electrofishing survey was completed at the Mullica Hill Pond (10 acres) on July 24th to evaluate the Largemouth Bass population. A total of 14 Largemouth Bass were collected in 0.30 hours of electrofishing, of which 9 were greater than the 200 mm stock size, resulting in a CPUE of 18 bass/hour. A total of 13 species of fish were collected including Bluespotted Sunfish, Swamp Darter, and Pirate Perch. The lake was previously part of the trout stocking program and removed due to limited access and concern for employee and angler safety, due to the high traffic volume on the roadway. Although traffic volume has been reduced, due to the creation of the Mullica Hill by-pass road, declining water quality and a significant reduction in the size of the pond do not make it a desirable candidate for trout stocking. A fish ladder was incorporated into the new dam and will be maintained by Harrison Township. The fish ladder should remain open only during the peak of the river herring run in April and May due to the presence of Northern Snakeheads downstream of the dam. This lake might get stocked in 2016 if surplus warmwater fish are available.

Pompton Lake (Passaic) – A daytime boat electrofishing survey was conducted here on July 23rd to assess the Largemouth Bass population. The survey lasted 1.56 hours and a total of 22 Largemouth Bass were captured ranging from 55 – 448 mm (2.2 – 17.6 in) in length, 9 of which were larger than 200 mm (CPUE of 6 bass/hr). The population appears to be moderately abundant and balanced with a PSD of 77. Other notable species captured were Northern Pike (stocked) (1 at 476 mm (18.7 in)), Bluegill Sunfish, and Yellow Perch. An electrofishing survey has not been conducted here in over 20 years and this data shall provide a baseline for future work. This lake will continue to be monitored.

Prospertown Lake (Ocean) – A boat electrofishing survey was completed at Prospertown Lake (80 acres) on July 6th to evaluate the developing fish population. The dam failed and was replaced in 2012. The lake was restocked in 2013 with Largemouth Bass, Bluegill, Golden Shiner, and Brown Bullheads. A total of 18 Largemouth Bass were collected in 1.05 hours of electrofishing. There were 12 bass greater than the 200 mm stock size resulting in a CPUE of 11 bass/hour. The PSD was 50 and RSD_{15} was 25 indicating the population is balanced. Reproduction appears to be adequate based on the number of Age I and young-of-the-year Largemouth Bass observed. No further stocking is recommended at this point. The Brown Bullhead population should be reduced to alleviate competition with native species.

Rising Sun Lake (Monmouth) – A boat electrofishing survey was completed at Rising Sun Lake (38 acres) on July 6th to evaluate the Largemouth Bass population. A total of 52 Largemouth Bass were collected in 0.70 hours of electrofishing. Twenty-four bass were greater than the 200 mm stock size resulting in a CPUE of 34 bass/hour and 28 were less than 200 mm. The PSD was 13 and RSD_{15} was 4, indicating the population is not balanced. These results were similar to a survey completed in 2014. The Bluegill and Pumpkinseed population appears to be adequate, with good numbers observed, however the lack of forage base species diversity may limit the growth and expansion of the bass population. The Largemouth Bass population should be resampled in 2017 to see if there are any changes. Golden Shiners should be stocked in 2016, if available from the hatchery.

Salem Canal (Salem) – A boat electrofishing survey was completed at the Salem Canal on July 21st to evaluate the Largemouth Bass population. Anglers reported an abundance of small Largemouth Bass below the 12" legal size limit, indicating possibly one or two very successful year classes. A total of 66 Largemouth Bass were collected in 1.34 hours of electrofishing, of which 43 were below the 200 mm stock size. The abundance of small fish should provide good fishing opportunities in the future. Scale samples were collected from a sub-sample of individuals below 200 mm for age determination. Growth rates were normal for fish of ages I and II. A follow up electrofishing survey will be completed in 2017 to evaluate the population distribution. No additional stocking is necessary at this time.

Sheppard Lake (Passaic) – Sheppard Lake, a 74 acre lake situated inside Ringwood State Park, is heavily used for multiple recreational purposes, such as swimming, kayaking, and fishing. A daytime boat electrofishing survey was conducted here on July 31st.The survey lasted 1 hour and a total of 60 Largemouth Bass were captured. However, only 6 Largemouth Bass were larger than 200 mm (7.9 in), indicating the population was unbalanced (CPUE of 6 bass/hr). The amount of fishing that occurs may have resulted in over harvest of Largemouth Bass. Sheppard Lake also has holdover trout water, but no trout were encountered in this survey. Another electrofishing survey will be completed in 2016 to obtain more data on this fishery.

Boat Electrofishing at Sheppard Lake

South Vineland Park Pond (Cumberland) – A boat electrofishing survey was completed at South Vineland Park Pond (30 acres) on July 30th to evaluate the Largemouth Bass and Smallmouth Bass populations. A total of 7 Largemouth Bass greater than 200 mm were collected in 1.00 hour of electrofishing. Abundant young-of-the-year (YOY) Largemouth Bass were observed during electrofishing, however no Smallmouth Bass were collected or observed. A total of five fish species including Largemouth Bass, Bluegill, Pumpkinseed, Black Crappie, and Yellow Perch were observed. The fish appeared to be occupying deeper water habitat than the electrofishing boat could effectively sample, therefore additional sampling during the spring of 2016 is required.

Steenykill Lake (Sussex) – Steenykill Lake was electrofished on August 3rd 2015 with a Smith Root Electrofishing boat to determine the health and status of the lake. Historical records indicate that Bridle Shiners were once found in the lake. In 2014, biologists from the Bureau sampled the lake (seine) for Bridle Shiners and to assess reproductive status of fish in the lake. Sampling with a seine proved difficult due to the lake's extensive vegetation. The 2014 results did not find any Bridle Shiner and suggests that the Largemouth Bass population may be small. The electrofishing survey in 2015 also did not find any Bridle Shiner and showed a limited Largemouth Bass population as only 2 Largemouth Bass was found during the survey. Unfortunately, the electrofishing boat malfunctioned and the survey was cut short. A return sampling effort is needed to help determine the status of the Largemouth Bass population. Further seining may also be necessary to determine if there are any remaining Bridle Shiner in the lake. Other species found during the survey include Chain Pickerel, Golden Shiner, Pumpkinseed, Bluegill, and Yellow Perch.

Sunset Lake (Cumberland) – The Sunset Lake dam failed in 2012 and the lake remained completely drained until the spring of 2015 when a dam repair was completed. Sunset Lake was one of the most popular bass fishing locations in the southern part of the state. The lake was restocked with Largemouth Bass and Bluegill by Hackettstown State Fish Hatchery in June of 2015. A boat electrofishing survey was completed at Sunset Lake (88 acres) on October 30th to evaluate the Largemouth Bass population. A total of 12 species of fish including Largemouth Bass, Bluegill, Creek Chubsucker, Fallfish, Black Crappie, Pumpkinseed, Golden Shiner, Common Carp, Chain Pickerel, Gizzard Shad, Banded Killifish, and Rainbow Trout were collected during one hour of daytime electrofishing. A total of 32 Largemouth Bass were collected. Twenty-nine of the bass collected were below the 200 mm stock size and the result of the recent hatchery stocking. The lake will be re-stocked with Largemouth Bass again in 2016. The population will continue to be monitored over the next couple years to determine stocking needs.

Tilcon Lake (Morris) – This 88-acre lake is located in Allamuchy Mountain State Park in Mt. Olive Township. When the Musconetcong River breached its banks during severe flood events in the early 2000's, water from the river inundated this former quarry and created the lake. Since 2011 the lake has been annually stocked with Smallmouth Bass (primarily fingerlings). When *Holdover Trout Lake* regulations were implemented at this lake in 2014, NJDFW began stocking catchable-sized Landlocked Salmon. The entire perimeter of the lake (and a small island) was electrofished at night on October 29, 2015 to assess the black bass fishery. Total run time was 1.53 hrs. The littoral areas dropped off sharply and expansive beds of aquatic vegetation (Eurasian Water Milfoil) extended into deeper water (but not to the surface) due to high water transparency (secchi disk measurement of 25 ft on August 25) made sampling difficult. Fish were not very numerous and all fish were collected to the extent possible. A total of 93 fish were captured and 10 species were documented (Largemouth Bass, Chain Pickerel, Landlocked Salmon, Bluegill, Pumpkinseed, Bluespotted Sunfish, Yellow Bullhead, Creek Chubsucker, Common Carp, and Alewife). A total of 18 LMB were captured, ranging in size from 72–474 mm (2.8–18.7 in) and weighed from 0.1–1.6 kg (0.2 oz – 3.5 lbs). Only the smallest of these fish was considered to be a young-of-the-year. Of the bass collected, 15 were at least 200 mm (8 in), for a low CPUE of 9.8 bass/hr. The bass may be more numerous than this catch rate indicates if they reside primarily in deeper water (due to the drop-offs) or if they already moved into deeper water due to cooling water temperatures (surface water temperature was 13.9°C). Twelve of the bass captured were at least 300 mm (12 in) and 8 of these were 380 mm (15 in) or greater. The PSD and RSD-P for bass could not be reliably determined because of the small sample size (suitable number of quality-length fish compared to stock-length fish not obtained). Despite recent stockings of Smallmouth Bass, none were encountered during this survey. The pickerel (18 individuals captured) ranged in size from 205–510 mm (8.1–20.1 in). The six Landlocked Salmon captured were likely those that were stocked earlier in the week. One Bluespotted Sunfish, a native sunfish species, was also collected. Another electrofishing survey (at night) should be conducted to better assess the bass fishery and to determine if continued stocking of Smallmouth Bass is warranted.

Warmwater Seining Assessment / Reproduction Checks

Shoreline seining was conducted in 21 lakes and ponds in July through mid-September to assess the status of warmwater fish reproduction, which aids in the management of their fisheries and helps assess stocking success or need. These data are also beneficial in documenting the presence of both native and invasive species. (Hunter & Angler Fund)

Alloway Lake (Salem) – A seining survey was completed at Alloway Lake (120 acres) on July 29th to evaluate the Largemouth Bass population. Alloway Lake was opened to the public in 2008 and a lake management plan was prepared in 2010. The lake has been managed as a Lunker Bass Lake since 2010. A total of 18 young-of-the-year (YOY) Largemouth Bass were collected in 12 seining locations. Largemouth Bass were found at 67% of the locations. A total of seven species of fish including Largemouth Bass, Bluegill, Yellow Perch, Black Crappie, Tessellated Darter, Bluespotted Sunfish, and Tadpole Madtom were collected. Additional stocking of Largemouth Bass will be considered in 2016.

Amico Island Pond (Burlington) – At the request of Burlington County Parks, a seining survey was completed at Amico Island Pond (1 acre) on July 16th. Due to limited access and seining locations only two locations were sampled. A total of seven young-of-the-year (YOY) Largemouth Bass and 11 YOY Bluegill were collected. The location appears to get a fair amount of fishing pressure and should be considered as a potential stocking location in the future for surplus warmwater fish.

Bear Pond (Sussex) – This shallow, privately-owned 63 acre lake was last surveyed in the 1950's, when it was open to public fishing through a boat livery. The 1950's survey documented 15 fish species, including Bluespotted Sunfish. The survey report also indicated two minnows found in the stomach of a pickerel may have been Bridle Shiners. However it is possible that these shiners may have been Creek Chubsuckers, which were also documented in the survey and are similar in appearance to Bridle Shiner. The 2015 survey was conducted to determine if Bluespotted Sunfish persist in the lake and if Bridle Shiners are present. Due to the steep ledges along the shoreline combined with mucky shallows only seven suitable sites were located and seined on September 24, 2015. Seven fish species (Largemouth Bass, Chain Pickerel, Yellow Perch, Bluespotted Sunfish, Bluegill, Pumpkinseed, and Black Crappie) were documented, with Bluegill the most abundant (79) followed by Pumpkinseed (33), and Bluespotted Sunfish (23). This fishery should be sampled again in 2016, using minnow traps to target locations having mucky substrate, to better assess cyprinids.

Crystal Lake (Burlington) – At the request of Burlington County Parks, a seining survey was completed at Crystal Lake (~5 acres) on July 28th. Only two seining locations were accessible. A total of three species of fish were collected including Largemouth Bass, Bluegill, and American Eel. Downstream of the spillway of Crystal Lake is a popular location for catching Northern Snakeheads. Poor access limits the ability to effectively sample the waterbody. No additional sampling or stocking is scheduled.

Egg Harbor Township Nature Reserve Pond (Atlantic) – A seining survey was completed at the Egg Harbor Nature Reserve Pond (~50 acres) on July 31st to evaluate the Largemouth Bass population. A total of 18 young-of-the-year (YOY) Largemouth Bass were collected in 12 seining locations. Largemouth bass were found at 67% of the locations. Only two species of fish were collected. Pumpkinseeds were encountered at 83% of sampled locations. No YOY Pumpkinseeds were collected. No additional sampling or stocking is recommended.

Hartshorne Woods Park Pond (Monmouth) - A reproductive check could not be conducted at Hartshorne Woods Pond (2 acres), Highlands on July 14th due to the heavy shoreline vegetation and the soft, silt bottom. Sunfish and Largemouth Bass were observed from a dock. Stocking is unnecessary.

Hyper Humus Ponds (Sussex) – The largest of ponds located in the Paulins Kill River Hyper Humus Wildlife Management Area known as Hyper Humus Pond had a rather large fish kill reported on April 11, 2015. The fish kill was investigated by NJDFW Pathologist Dr. Jan Lovy, who estimated over one thousand fish including over a thousand sunfish and several hundred large Largemouth Bass were found dead. Most of the bass were over 15" in length and some were estimated to be around five pounds. A single large carp was also observed dead. Water quality parameters appeared normal (temp: 12.5°C, dissolved oxygen of 10.5 mg/L, and a pH of 8.5). It was determined that the cause of the fish kill was due to low dissolved oxygen levels in the pond. Low dissolved oxygen levels can occur in shallow ponds with large snow and ice accumulations limiting the amount of sunlight to reach plants in the lake limiting photosynthesis which release oxygen. The plants die and decompose, which further uses oxygen dissolved in the water. The whole process is known as "winter kill." Hyper Humus Ponds were originally created in the 1900's by a peat and humus mining operation belonging to the Hyper Humus Company. The pond is only a couple of feet deep with high levels of decomposing vegetation and will most likely suffer from re-occurring winter kill preventing a fishery to fully develop. Sampling of the pond with a seine was attempted this summer, but the substrate, dominated by decaying plant matter, made it nearly impossible to seine and no fish were collected. It was determined that management of the Hyper Humus Wildlife Management Area ponds should be directed towards birds and other wildlife and not as a fishery. The ponds will not be stocked in response to this winter's fish kill or future fish kills that may occur.

Indian Lake (Bergen) – At the request of an angler who reported that a fish kill occurred during Hurricane Sandy, a reproductive check was conducted at Indian Lake (6 acres) in Little Ferry on July 28th. This lake is stocked with trout during the spring, and as expected, none were collected during this summertime survey. The fish assemblage consisted of six species included Largemouth Bass (3), Black Crappie (9), Pumpkinseed (115), White Perch, Mummichog, and Banded Killifish. The low numbers of Largemouth Bass and Black Crappies collected indicate that perhaps a fish kill did take place as a result on Hurricane Sandy, although it was never reported at that time. Salinity (1.13 ppt) was acceptable to restock freshwater fish and as a result the Hackettstown State Fish Hatchery will stock Largemouth Bass, Bluegill, and Brown Bullheads in 2016.

Lincoln Park Pond (Hudson) - At the request of an angler, a reproductive check was conducted at Lincoln Park Pond (4 acres) in Jersey City on August 11th. The fish assemblage consisted of only two species: Pumpkinseed and Killifish sp. As a result of this survey the Hackettstown State Fish Hatchery stocked: Largemouth Bass, Bluegill, and Brown Bullheads. A follow-up survey should be conducted within the next few years to determine the status of the fishery.

Olympia Lakes (Burlington) – At the request of Burlington County Parks, a seining survey was completed at both lakes at Olympia Lakes (~20 acres) on July 16th. A total of 12 locations were sampled in the "front lake" and eight locations were sampled in the "back lake." Five species of fish were collected including Largemouth Bass, Bluegill, Mosquito Fish, Banded Killifish, and Bluespotted Sunfish. Bluegill were determined to be rather abundant with both young-of-the-year (YOY) and intermediates well represented. Only three YOY Largemouth Bass were collected. A boat electrofishing survey should also be conducted in 2016 to better assess the fish population. Both lakes will be stocked with Largemouth Bass in 2016 due to the excessive fishing pressure.

Rosedale Lake (Mercer) - Rosedale Lake (30 acres) was seined as part of a native fishes assessment in which staff are going back to waterbodies where rare fish were previously documented. Bridle Shiners were documented in Rosedale Lake in 1970. Unfortunately, none were found when surveyed on June 11. The assemblage of fish was typical for a park pond, consisting of a well balanced, reproducing Largemouth Bass and Bluegill population, however no young-of-the-year (YOY) Bluegills were found due to the early date in which this lake was seined. Other species collected include Black Crappie, Banded Killifish, Golden Shiner, and Gizzard Shad. Rosedale Lake is stocked with Rainbow Trout in the spring and fall and Channel Catfish annually.

Round Valley Reservoir (Hunterdon) - Round Valley Reservoir (2,350 acres) is an oligotrophic lake that managed as a Trophy Trout Lake and has produced four current state records (Lake Trout, Brown Trout, Smallmouth Bass, and American Eel). The primary forage base was historically Alewives, however the population declined in the mid-1990's and is virtually non-existent today. In an effort the re-establish an alternate forage species, Golden Shiners were stocked in recent years cooperatively by Round Valley Trout Association and NJDFW. Round Valley Reservoir was seined on June 12 to determine if the Golden Shiners have established and if they are reproducing. Although no Golden Shiners were found, an assortment of other baitfish species was documented including Banded Killifish and Spotfin Shiners. Only one Largemouth Bass and no Smallmouth Bass were collected during this survey. Other species found include Rock Bass, Redbreast Sunfish, and Bluegill.

Ruckman's Pond (Bergen) – A reproductive check was conducted at Ruckman's Pond (3 acres) at The Closter Nature Preserve, Closter on August 7th. The fish assemblage consisted of four species including Largemouth Bass, Pumpkinseed, Green Sunfish, and Golden Shiner. Subsequent to the sampling, after a discussion with the preserve's manager, stocking was determined to be needed. He was interested in stocking Triploid Grass Carp to control the over abundant aquatic vegetation. An application was submitted, reviewed and approved for the stocking of 10 Triploid Grass Carp.

Smithville Lake (Burlington) – At the request of Burlington County Parks, a seining survey was completed at Smithville Lake (10 acres) on July 28th. A total of six locations were sampled and six species of fish were collected including Bluegill, Brown Bullhead, Golden Shiner, Largemouth Bass, Black Crappie, and Pumpkinseed. Bluegill and Brown Bullhead were the most abundant species collected. The lake is extremely shallow however this location may benefit from surplus warmwater fish including Largemouth Bass, Brown Bullhead, and Black Crappie.

Steenykill Lake (Sussex) – On August 24, Bureau of Freshwater Fisheries staff sampled Steenykill Lake with a seine to determine the current fish species composition of the lake. Historical records show that a rare native species, Bridle Shiner, were once found in the lake. Unfortunately, no Bridle Shiners were found at the 6 sites sampled during this survey. Previous sampling in 2014 with a seine also did not yield any Bridle Shiner. After two un-successful attempts to find Bridle Shiners in Steenykill Lake, it is likely that the species has been lost from this location. However, it is important to note that seining is difficult in Steenykill Lake as it has steep slopes and significant aquatic vegetation that impedes seining. It is possible that Bridle Shiners do reside in the lake and were just not collected under the difficult sampling conditions. Other species found during this survey include Chain Pickerel, Largemouth Bass, Bluegill Sunfish, Pumpkinseed Sunfish, and Golden Shiner. Other sampling techniques such as minnow traps should be considered before claiming that Bridle Shiner are lost from the lake.

Stephen R. Gregg Park Pond (Hudson) – At the request of an angler, a reproductive check was conducted at Stephen R. Gregg Park Pond (3 acres) in Bayonne on August 10th. The fish assemblage consisted of only one species: Mummichog. As a result of this survey the Hackettstown State Fish Hatchery stocked: Largemouth Bass, Bluegill, and Brown Bullheads. A follow-up survey should be conducted within the next few years to determine the status of the fishery.

Strawbridge Lake (Burlington) - Strawbridge Lake (14 acres) was surveyed as part of a native fishes assessment in which staff are resampling waterbodies where less common fish were previously documented. This waterbody has experienced multiple drawdowns, fish salvages, and stockings in it's history. Bluespotted Sunfish were collected when surveyed in 1950 and were considered common to this waterbody. This seining survey yielded a well balanced population of Largemouth Bass, Pumpkinseeds, and Bluegills. Other species encountered include Black Crappie, Brown Bullhead, Mosquitofish sp, and a limited number of Bluespotted Sunfish. In addition, several Enneacanthus species less than 20 mm in length were retained, but too small to be identified to the species level. Native species found in 1950, but not in this brief survey, include Chain Pickerel, Redbreast Sunfish, Creek Chubsucker, and Eastern Mudminnow, however additional effort may unveil these species.

Success Lake (Ocean) – A seining survey was conducted at Success Lake (57 acres) in response to a discussion that took place at the Jersey Shore Aquarium Society Meeting in April 2013. A presentation was given to the members of the Society in which information was presented regarding the status of Native and Non-native freshwater fish. A member suggested that NJDFW conduct a survey at Success Lake, as he recalls collecting the rare Ironcolor Shiner from this location. Although the Ironcolor Shiner was not found during this survey, the lake has primarily a native fish assemblage composed of Swamp Darter, Banded Sunfish, Bluespotted Sunfish, Pirate Perch, Chain Pickerel, and Creek Chubsucker. Only two non-native fishes were found, Bluegills and Largemouth Bass. In fact only one Largemouth Bass was captured. This low abundance is expected, as Success Lake is naturally very acidic (5.13 pH). A pH of less than 5 is considered to be too low for consistent reproduction of this species. This condition warrants the prioritization to manage it for native acidophilic species, such as those that are found here, and to abandon the notion of stocking non-native game species, and should not be stocked.

Bluespotted Sunfish

Topanemus Lake (Monmouth) – Following a request by the local environmental commission, a reproductive check was conducted at Topanemus Lake (21 acres) in Freehold Township on August 3. The fish assemblage was relatively diverse for a park pond, consisting of eight species including Largemouth Bass, Chain Pickerel, Black Crappie, Bluegill, Pumpkinseed, Yellow Perch, Brown Bullhead, and Golden Shiner. Largemouth Bass and sunfish species appear to be well-balanced with an average of 3.75 Largemouth and 35 sunfish per seine haul. Topanemus Lake is stocked with Rainbow Trout in the spring and winter. Channel Catfish will continue to be stocked in this lake, however survey results indicate there is no need to stock any additional warmwater fish at this time.

Tuckahoe Lake (Atlantic) - Tuckahoe Lake (19 acres) was surveyed as part of a native fishes assessment in which staff are returning to waterbodies where rare fish were previously documented. Mud Sunfish were recorded from the 1950 survey and they appeared in this seining survey as well. Quite a few Enneacanthus species were collected during this survey. A small subsample were confirmed as Banded Sunfish, however the majority of specimens were released and may have been Bluespotted Sunfish. Additional native species encountered include Chain Pickerel, Eastern Mudminnow, and Yellow Bullhead. A limited number of non-native fish were collected including Largemouth Bass, Bluegill, and Mosquitofish sp. Additional seining should be conducted and at least 20 Enneacanthus retained for laboratory identification.

Wilson Lake (Gloucester) - A seining survey was completed at Wilson Lake (58 acres) on July 14th to evaluate the Largemouth Bass population. A total of 6 young-of-the-year (YOY) Largemouth Bass were collected in 8 seining locations. Largemouth bass were found at 3 out of 8 locations. A total of 5 species of fish were collected, including 3 *Enneacanthus sp*. YOY. A dam repair project was completed during the winter of 2014/2015 which involved a substantial lowering. The lake will be electrofished in the spring of 2016 to determine if additional stocking is necessary.

ANADROMOUS FISHERIES

A number of New Jersey's river systems serve as important migratory pathways for fish. Each spring anadromous species such as American Shad, Alewife, Atlantic Sturgeon, Blueback Herring, Sea Lamprey, Shortnose Sturgeon, and Striped Bass navigate from marine waters to fresh waters of the state to spawn. In late summer and early fall, their young return home to marine waters to remain until maturity. In contrast, catadromous species such as American Eel reside in fresh waters throughout the state and migrate to open ocean waters to spawn.

With perhaps the exception of lampreys, these species are of great ecological, recreational, and commercial value to New Jersey and many other Atlantic coast states. The monitoring and restoration of these fisheries is a fundamental aspect in ensuring the population's well being. As these species reside in both fresh and marine waters they are cooperatively management between the Bureau of Freshwater Fisheries and the Bureau of Marine Fisheries. As stocks migrate up and down the entire east coast, the management of species falls under the jurisdiction of the Atlantic States Marine Fisheries Commission (ASMFC). As a result, for New Jersey, primary management of these species falls to the Bureau of Marine Fisheries.

In March 2012 the recreational and commercial harvest of migratory river herring (Alewife and Blueback Herring) was prohibited. These regulations were put in place due to concerns about the significant coast-wide decline of river herring stocks and to comply with federal mandates outlined by the Atlantic States Marine Fisheries Commission. In 2013 a similar moratorium was placed on American Shad with the exception of the Delaware River, its bay and estuaries. The exact cause for these coast-wide declines remains uncertain, but numerous factors such as loss of spawning habitat, impediments to fish passage (i.e. dams), water quality degradation and fishing all likely played a role.

Freshwater efforts consist of monitoring fish passage through fish ladders, technical assistance for dam removal projects on migratory pathways, periodic confirmation of historic migratory pathways and identification of new runs. (Federal Grant F-48-R, Project I)

2015 activities include:

The **Paulins Kill River Restoration Project** is a multi-faceted partnership led by the Nature Conservancy, with goals of restoring connectivity to NJ's third largest tributary to the Delaware River and improving both riparian and in-stream habitat. One major aspect of the project is the removal of the Columbia Lake Dam, which was built by the Jersey Central Power and Light Company (JCP&L) in 1909. This 18-foot high, 330-foot long dam is located on the Paulins Kill less than ¼ mile upstream from its confluence with the Delaware River. The dam impounds a 32-acre reservoir that stretches more than 1.5 miles upstream of the dam. The State of New Jersey owns both the dam (sold by JCP&L in 1955) and 1,098 of the surrounding acres, and manages it as the Columbia Wildlife Management Area. The impacts that this dam has on the Paulins Kill are significant; cutting off access to historic spawning grounds by American Shad,

impeding passage of other migratory fish like American Eel and Sea Lamprey, disrupting the river's natural hydrology and sediment transport, and warming the water impounded behind the dam, among other effects. The ultimate desired ecologic outcome for the removal of the Columbia Lake Dam is to improve the overall health of this section of the Paulins Kill and maximize conservation and recreational benefits for nearby communities and businesses. This spring, the Bureau of Freshwater Fisheries began sampling the Paulins Kill to document and measure current fish assemblages prior to the proposed removal of the dam. The following is a summary of the NJDFW's 2015 sampling efforts. Additional sampling is planned for the spring of 2016 and will continue into future years to document pre and post dam removal fish assemblages. (Federal Grant F-48-R, Project II)

Eight sampling locations, in 12 field days, for a total of 257 man hours have been used in 2015 to collect data for this study. Data can be found in Appendix A (pages A35-A41) Six sampling techniques were utilized; stream electrofishing, boat electrofishing, gill nets, trap nets, seines, and cast nets with varying levels of success. The Paulins Kill being a large, wide, and deep river complicates sampling which is why so many different sampling techniques have been utilized. Lower than average water levels this spring aided in 2015 sampling efforts.

American Shad caught by angler below the Columbia Lake Dam

Overall, 1,770 individual fish representing 41 different species were collected, inspected and released. Anadromous fish species such as American Shad (29) and Blueback Herring (1) were documented below the Columbia Lake Dam, but not found above the Dam confirming that the Dam is a barrier to fish passage of these anadromous species. Over 400 American Eels (257 smaller than 200mm) were found in 2 locations below the Columbia Lake Dam. This compares to only 44 American Eels (8 smaller than 200mm) found in 6 locations above the Dam. These data illustrate that the Columbia Lake Dam is restricting the passage of this catadromous species as well. Additional sampling locations above and below the dam will continue in the spring of 2016 and in future years.

Columbia Lake Dam

In addition to the fish sampling, an Angler Creel Survey was also conducted on the Paulins Kill. Four students from Warren County Community College spent approximately 125 hours on 31 days interviewing anglers on their experience and opinions on the Paulins Kill from April 12th through June 15th 2015. Data from this survey is currently being analyzed.

The Bureau participates in the **Musconetcong River Restoration Partnership**. The current focus of the partnership is the removal of the Hughsville and Warren Glen dams. A federal grant has been secured by the Musconetcong Watershed Association for the removal of the Hughsville Dam. This dam is approximately 4 miles upstream from the river's confluence with the Delaware River and is the first blockage fish encounter when migrating upstream from the Delaware River, now that two dams downstream have been successfully removed. An estimated 21,000 cubic yards of sediment that lies above the dam will need to be removed and properly disposed. It is anticipated that this dam will be removed 2016. Biological monitoring, particularly of the fisheries, is important because many of the grant proposals submitted for past and future dam removals cite anadromous fish restoration as key benefit of these dam removals.

Hughsville Dam on the Musconetcong River

On May 27 the Musconetcong River was electrofished immediately below the Hughsville dam at Warren Glen (Hunterdon/Warren). The purpose of the survey was to determine if anadromous fish species found in the Delaware River (American Shad, Alewife, Blueback Herring, and Striped Bass), which migrate upstream during the spring to spawn, were present below the dam. Assorted warmwater (non-anadromous) fish species were captured, but no anadromous species were encountered Appendix A (page A32). The absence of anadromous fishes in this survey is not considered conclusive because the pools immediately below the dam are too wide and deep to be effectively electrofished, such that resident and migratory fishes present could easily elude capture. The next dam upstream at Warren Glen is significantly larger than the Hughsville Dam, and there is an estimated 250,000 cubic yards of sediment trapped above the Warren Glen Dam. The Warren Glen Dam (partially owned by NJDFW) is a significantly higher dam (37 feet high) and efforts to remove this dam are proceeding more slowly, in part because of the magnitude of the project. (Federal Grant F-48-R, Project II)

Conservation and Restoration of Fish Habitat and Technical Assistance: Anadromous

In order to protect New Jersey's critical aquatic resources, fisheries biologists participate in or provide input on a number projects each year. Bureau staff provides technical assistance related to conservation, stream restoration, dam removal projects, and Land Use projects.
Land Use projects are coordinated through the Division's Bureau of Environmental Review. This input is directed towards minimizing land use change impacts to the state's fisheries resources. This is typically accomplished through the use of timing restrictions during critical fish spawning periods, protection of riparian buffers, and project modification, assuring best use practices are implemented at all times. However, at times a more in depth review and comments are necessary on specific projects.

In 2015 staff provided technical assistance to the following project related to our anadromous fisheries resources:

The **Island Farm Weir Fish Ladder on Raritan River** has been monitored by the NJ Bureau of Freshwater Fisheries from 1996 through 2003, and in 2005, 2011, and 2012. The final report for JOB I-5: American Shad Restoration in the Raritan River, was submitted in January 2013. Beginning in the spring of 2013, the Department of Marine & Coastal Sciences at Rutgers University conducted the monitoring under the direction of Dr. Olaf Jensen, assisted by graduate student, Orion Weldon. Bureau staff assisted Rutgers staff with the clean out of the ladder in the spring of 2015. (Hunter and Angler Fund)

NATIVE SPECIES

New Jersey is home to nearly 60 Native Fishes, which form a significant component of the state's aquatic biological diversity and natural resource heritage. A list of fish species found in New Jersey can be found in Appendix E. While many native fish species are common, abundant, and widely distributed, there also some that are of conservation concern including, but not limited to the Bridle Shiner, Ironcolor Shiner, Comely Shiner, Northern Hog Sucker, Mud Sunfish, Blackbanded Sunfish, Bluespotted Sunfish, Banded Sunfish, Shield Dater, Slimy Sculpin, and Brook Trout. Many factors including land use changes, habitat loss, decline in water quality, and presence of invasive species threaten the survival of all aquatic biota, primarily those most sensitive.

Slimy Sculpin

The loss of any of these unique fish species through human impact is an undesirable outcome. In addition, natural factors such as climatic variations and watershed succession may dictate the future decline or expansion of fishes that are on the periphery of their established ranges. Further study is required to determine the current abundance and distribution of these nongame fishes throughout the state, including additional fisheries surveys, gathering additional fisheries data from other agencies, mapping, and determination of status for each species, all of which will result in the formation specific management objectives.

Shield Darter

Status Evaluation of Native Freshwater Fishes

A formal review process led by the NJDFW's Endangered and Nongame Species Program was conducted in 2014 and 2015 to determine the status of our native freshwater fishes, known as the **Delphi Technique**. It is a systematic method for reaching consensus among experts in which absolute, quantitative answers are either unknown or unattainable. It is an iterative process characterized by anonymity among the participating experts, controlled feedback via the principal investigator and a statistical estimator of group opinion. By structuring the group communication process, the Delphi Technique helps the group reach a consensus of opinion by incorporating all available data and disseminating those data among all participants. The Delphi will assist the NJDFW's efforts towards updating New Jersey's State Wildlife Action Plan. To assist the Delphi efforts, the NJDFW created species distribution maps using GIS, based on data collected from 2000 through 2012. (Hunter and Angler Fund)

Preliminary Delphi Results
Sixty-five species were evaluated by an expert panel during round one, in which status selections, confidence levels, and comments were submitted by reviewers and compiled by ENSP staff. Preliminary results of all four rounds are listed below.

Round One: Reviewers reached consensus on the following 34 species:
Endangered: Shortnose Sturgeon
Secure/Stable: (32 species) American Eel, Banded Killifish, Blacknose Dace, Bluespotted Sunfish, Brown Bullhead, Chain Pickerel, Common Shiner, Creek Chub, Creek Chubsucker, Cutlip Minnow, Eastern Mudminnow, Eastern Silvery Minnow, Fallfish, Gizzard Shad, Golden Shiner, Margined Madtom, Mummichog, Pirate Perch, Pumpkinseed, Redbreast Sunfish, Redfin Pickerel, Satinfin Shiner, Sea Lamprey, Spotfin Shiner, Spottail Shiner, Swallowtail Shiner, Tadpole Madtom, Tessellated Darter, White Perch, White Sucker, Yellow Perch, Yellow Bullhead
Not Applicable: Longnose Gar
No Opinion (therefore removed): Fourspine Stickleback, Hogchoker, Ninespine Stickleback, Rainbow Smelt, Rainwater Killifish, Threespine Stickleback

Round Two: Reviewers reached consensus on the following 9 species:
Endangered: Ironcolor Shiner
Threatened: Slimy Sculpin
Special Concern: Northern Hogsucker
Secure/Stable: Banded Sunfish, Swamp Darter, Quillback, White Catfish
Not Applicable: Black Bullhead, Bluntnose Minnow
No Opinion (therefore removed): Alewife, American Shad, Blueback Herring, Gizzard Shad, Hickory Shad, Spotfin Killifish

Round Three: Reviewers reached consensus on the following species:
Not Applicable: Pearl Dace

Round Four: Reviewers reached consensus on the following 3 species:
Special Concern: Brook Trout, Comely Shiner, Shield Darter
Species in which no consensus was reached include the following 5 species:
American Brook Lamprey, Blackbanded Sunfish, Bowfin, Bridle Shiner, Mud Sunfish

A formal report on the status review will be completed Division's Endangered and Nongame Species Program and the findings will be presented to the Endangered and Nongame Species Advisory Committee (ENSAC) during one of their regular meetings in 2016. During this time, committee members will vote on the results, and also resolve status for species that failed to achieve 85% consensus but may warrant listing. After ENSAC votes on species' status recommendations, the next step will be assigning official status via the rulemaking process.

American Brook Lamprey

State Wildlife Action Plan

The Bureau of Freshwater Fisheries participated in the ten-year revision of the State Wildlife Action Plan (SWAP). The SWAP is a strategic and cost-effective mechanism to preserve the state's wildlife resources for the future. Recovery of species that have reached threatened or endangered status is typically more costly than preventative actions that keep species populations from reaching such declines. Proactive management actions identified in the SWAP are intended to keep species from becoming federally (and state) threatened and endangered. NJDFW is currently updating the 2005 Wildlife Action Plan as required by Congress to continue to receive federal State Wildlife Grants. More importantly, New Jersey's update will serve as a blueprint for conserving our wildlife heritage. The plan will identify priority actions addressing known threats facing our targeted species and habitats that we, as a conservation community, can implement in the next ten years.

Blackbanded Sunfish

A variety of tasks were required, including the prioritization of approximately 60 native fish species to determine those Species of Greatest Conservation Need. For these species, additional information was compiled to demonstrate species distribution, habitat information, state and range-wide status, etc. Species of Greatest Conservation Need were evaluated using several processes that resulted in the selection of eight Top Tier species which were grouped into the following categories: Brook Trout, Pinelands Fishes (Banded Sunfish, Blackbanded Sunfish, Mud Sunfish, and Swamp Darter), and Vulnerable Minnows (Bridle Shiner, Comely Shiner, and Ironcolor Shiner).

Mud Sunfish

A Threat Assessment was conducted for each species, aimed at identifying a standard list of threats that act as stressors to negatively impact each species. Threats are organized in a hierarchy in which broader (Level 1) threats are subdivided into more specific threats (Levels 2 and 3). Examples of Level 1 threats include development, agriculture, invasive species, pollution, etc., while Level 3 threats are much more specific. A scoring system was created to evaluate priority watersbodies (both lentic and lotic), using a multitude of data including fish presence/absence, diversity indices, landcover/landuse layers, etc. in an attempt to prioritize the states waters that are in the greatest need of conservation. Finally, the Bureau participated in two stakeholder meetings on July 16 and 22 that were aimed to address threats to the top 107 species of greatest conservation need to be identified in upcoming revisions to the SWAP.

Native Species Data Collection Efforts

Fifteen waterbodies were surveyed in 2015, specifically targeting native fishes (see table below). Summaries of individual surveys are in table below.

List of sites surveyed in 2015 searching for less common freshwater fish species.

Stream	Survey Date	Significance	Page #
Southern Region (Lower Delaware River and Lower Atlantic Coastal)			
Strawbridge Lake (Burlington)	6/17/15	Historic Bluespotted Sunfish & Swamp Darter. Only Bluespotted Sunfish found in 2015.	74
Tuckahoe Lake (Cape May)	6/22/15	Historic Mud, Bluespotted, & Banded Sunfish. Mud, Banded, & unidentified Enneacanthus Sunfish found in 2015.	75
Upper Delaware Region (Upper Delaware & Wallkill)			
Bear Pond (Sussex)	9/24/15	Historic Bluespotted Sunfish & possible Ironcolor Shiner. Only Bluespotted Sunfish found in 2015.	71
Kymer Brook (Sussex)	9/9/15	Adjacent Ironcolor Shiner. None found in 2015. Bluespotted Sunfish found in 2015.	A20
Kymer Brook (Sussex)	9/9/15	Adjacent Ironcolor Shiner. Ironcolor Shiner found in 2015.	A21
Kymer Brook (Sussex)	9/9/15	Adjacent Ironcolor Shiner. Ironcolor Shiner found in 2015.	A22
Papakating Creek (Sussex)	8/20/15	Historic Bridle Shiner. None found in 2015.	A33
Pequest River (Trib) (Green Twp.) (Sussex)	9/9/15	Historic Ironcolor Shiner. Confirmed in 2015.	A42
Pequest River (Trib) (Readings Pond) (Sussex)	9/9/15	Adjacent Ironcolor Shiner. None found in 2015.	A43
Shabakunk Creek (Mercer)	9/3/15	Historic Bridle Shiner. None found in 2015.	A47
Steenykill Lake (Sussex)	8/24/15	Historic Bridle Shiner. None found in 2015.	74
Passaic Region (Passaic, Hackensack, & Hudson) and Upper Atlantic			
Black Brook (Morris)	8/14/15	Potential Pinelands fishes. Bluespotted Sunfish found in 2015.	A59
Success Lake (Ocean)	8/31/15	Public lead on Ironcolor Shiners None found in 2015.	75
Raritan Region (Raritan, Arthur Kill, Raritan Bay, Shrewsbury, & Navesink)			
Beden Brook (Mercer)	9/3/15	Historic Bridle Shiner & Swallowtail Shiner. Confirmed in 2015.	A68
Beden Brook (Somerset)	9/2/15	Adjacent Bridle Shiner. None found in 2015. New Swallowtail Shiner found in 2015.	A69
Beden Brook (Trib) (Rocky Hill) (Somerset)	9/2/15	Adjacent Bridle Shiner. None found in 2015.	A70
Raritan River S/Br (Somerset)	8/6/15	Historic Bridle Shiner. None found in 2015. New Shield Darter found in 2015.	A88
Rosedale Lake (Mercer)	6/11/15	Historic Bridle Shiner. None found in 2015.	73

In addition to the sites that were surveyed specifically for rare native species, all 225 fisheries surveys conducted by the Bureau contribute valuable information to the status and distribution of fishes, including some of New Jersey's less common native fishes. The table below lists species with a Round 4 Delphi consensus of Special Concern, Threatened, Endangered, or no consensus. The number of sites in which each species was found during 2015, along with the number of sites that mark the first time each species was documented at that location are also found in the table below.

List of less common species in which consensus was not reached or consensus of Special Concern, Threatened, Endangered was reached during the Delphi, including number of locations in which each species was encountered during 2015.

Species	Proposed status after Round 4	Number of sites	New sites
American Brook Lamprey	No Consensus	6 (2 from 1 river)	2
Bridle Shiner	No Consensus	1	0
Brook Trout (see Wild Brook Trout Assessment page 43)	Special Concern	43 (6 from 1 river)	1
Blackbanded Sunfish	No Consensus	0	0
Comely Shiner	Special Concern	0	0
Ironcolor Shiner	Endangered	3 (2 from 1 stream)	2
Northern Hog Sucker	Special Concern	3 (2 from 1 river)	1
Mud Sunfish	No Consensus	2	2
Shield Darter	Special Concern	12 (7 from 1 river)	8 (7 from 1 river)
Slimy Sculpin	Threatened	18 (8 from 3 streams)	0

Only Bridle Shiner found in 2015

Ironcolor Shiners found in 2015

Conservation and Restoration of Fish Habitat and Technical Assistance: Native Species

In order to protect New Jersey's critical aquatic resources, fisheries biologists participate in or provide input on a number projects each year. Bureau staff provides technical assistance related to conservation, stream restoration, dam removal projects, and Land Use projects.
Land Use projects are coordinated through the Division's Office of Environmental Review. This input is directed towards minimizing land use change impacts to the state's fisheries resources. This is typically accomplished through the use of timing restrictions during critical fish spawning periods, protection of riparian buffers, and project modification, assuring best use practices are implemented at all times. However, at times a more in depth review and comments are necessary on specific projects.

In 2015 staff provided technical assistance to the following project related to our native fisheries resources:

Worked with Office of Environmental Review biologist Kelly Davis to review the Leidy Southeast Pipeline Expansion Project. Two phases known as the Skillman Loop (Montgomery and Princeton Townships) and the Pleasant Run Loop (Branchburg, Readington, and Clinton Townships) will cross 25 and 28 streams respectively. Although the streams are classified as Non-Trout in the NJ Surface Water Quality Standards, this watershed is home to sensitive species such as the Bridle Shiner and Comely Shiner that are currently listed as species of regional priority in the New Jersey Wildlife Action Plan and are currently candidates for state Threatened and/or Endangered listing.

INVASIVE SPECIES

Aquatic Invasive Fishes Management

New Jersey is host to over 85 freshwater fish species and of these nearly 60 are native. Native fishes contribute to the biological integrity of aquatic communities and may also be economically, recreationally, and culturally important. Introductions of invasive, non-native fish and aquatic plants are a growing concern of natural resource managers in New Jersey and elsewhere because of their potential to dominate and destroy aquatic ecosystems causing irreversible economic and cultural damage. (Federal Grant F-48-R, Project I)

In New Jersey ten species of fish have been identified having the potential to become a significant threat to indigenous animals, the environment, or public safety hazard. These include: Asian Swamp Eel, *Monopterus albus*, Bighead Carp, *Hypophthalmichthys nobolis*, Brook Stickleback, *Culaea inconstans*, Flathead Catfish, *Pylodictis olivaris*, Grass Carp (diploid), *Ctenopharyngodon idella*, Green Sunfish, *Lepomis cyanellus*, Oriental Weatherfish, *Misgurnus anguillicaudatus*, snakeheads, *Channa spp*., Silver Carp, *Hypophthalmichthys molitrix*, and Warmouth, *Lepomis gulosus.* To date, all but the Silver Carp have been documented in New Jersey waters. Possession and/or release of live potentially dangerous fish species is prohibited and when these species are encountered while angling they must be destroyed.

Locations surveyed by NJDFW in 2015 for invasive fish species are listed and described in detail in table below. Green Sunfish were excluded from this table, as they are now fairly widespread, found at 16 locations in 2015 and now documented in 15 of 21 counties.

Nineteen Locations sampled by NJDFW for invasive species (excluding Green Sunfish) in 2015.

Location	Drainage	Date	Species Targeted	Sampling Gear	Run Time (Hours)	Number of Fish
Cooper River Lake*	Cooper River	8/3/15	Northern Snakehead	Electrofishing	1.24	1
Delaware River (Pennsauken Creek)*	Delaware River	8/4/15	Northern Snakehead	Electrofishing	1.05	0
DOD Lake*	Delaware River	7/13/15	Northern Snakehead	Electrofishing	1.30	2
First Neshanic River	Raritan R. S/Br	8/25/15	Oriental Weatherfish	Electrofishing	NA	0
Hilliards Creek	Cooper River	8/14/15	Asian Swamp Eel	Electrofishing	0.38	1
Neshanic River	Raritan R. S/Br	8/6/15	Oriental Weatherfish	Electrofishing	0.50	34
Neshanic River	Raritan R. S/Br	7/2/15	Oriental Weatherfish	Electrofishing	NA	5
Neshanic River (Trib) (E. of Hart Blvd)	Raritan R. S/Br	6/25/15	Oriental Weatherfish	Electrofishing	NA	1
Neshanic River (Trib) (E. of Hart Blvd)	Raritan R. S/Br	6/30/15	Oriental Weatherfish	Electrofishing	NA	13
Neshanic River (Trib) (E. of Hart Blvd)	Raritan R. S/Br	7/2/15	Oriental Weatherfish	Electrofishing	NA	1
Neshanic River (Trib) (Hart Blvd)	Raritan R. S/Br	7/1/15	Oriental Weatherfish	Electrofishing	NA	12
Neshanic River (Trib) (Hart Blvd)	Raritan R. S/Br	7/1/15	Oriental Weatherfish	Electrofishing	NA	4
Neshanic River (Trib) (Hart Blvd)	Raritan R. S/Br	7/2/15	Oriental Weatherfish	Minnow Trap	20	1
Neshanic River (Trib) (Hart Blvd)	Raritan R. S/Br	7/2/15	Oriental Weatherfish	Electrofishing	NA	1
Raritan River S/Br *	Raritan R. S/Br	8/6/15	Oriental Weatherfish	Electrofishing	0.87	1
Second Neshanic River	Raritan R. S/Br	8/25/15	Oriental Weatherfish	Electrofishing	NA	0
Second Neshanic River	Raritan R. S/Br	8/25/15	Oriental Weatherfish	Electrofishing	NA	0
Silver Lake	Cooper River	7/14/15	Asian Swamp Eel	Electrofishing	0.33	44
Silver Lake	Cooper River	8/14/15	Asian Swamp Eel	Electrofishing	0.98	34

* Sampled as part of other field activities

Asian Swamp Eel

Monitoring and control of the Asian Swamp eel has been limited to backpack electrofishing removal methods. The complexity of the habitat and physiological adaptability of the Asian Swamp Eel significantly hinders chances of successful eradication.

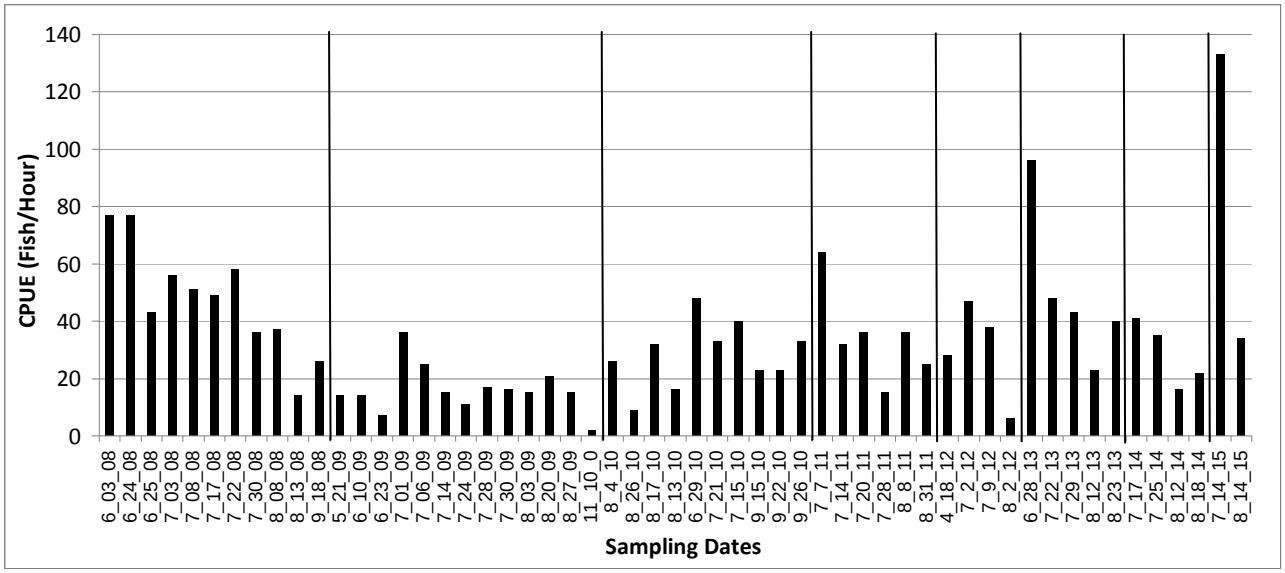
Asian Swamp Eel

Silver Lake (Camden) – Backpack electrofishing surveys have been conducted annually at Silver Lake to monitor the Asian Swamp Eel population since 2008, when they were first discovered there. In 2015 two backpack electrofishing surveys were completed at Silver Lake (10 acres) on July 14th and August 14th to monitor the invasive Asian Swamp Eel population. A total of 44 Swamp Eels were removed during 0.33 hours of electrofishing on July 14th and 34 were removed during 0.98 hours of electrofishing on August 14th. Increased monitoring and removal efforts will continue in 2016. The catch-per-unit-effort (CPUE) of 59 fish/hr.) was the highest since 2008 and presumably due to low sampling effort (See table and figure below).

History of Asian Swamp Eel collection at Silver Lake, Camden County.

Year	Number of Asian Swamp Eels Collected	Total Run Time (hrs)	Catch per unit effort (CPUE)
2008	355	7.73	46
2009	189	11.68	16
2010	224	7.68	29
2011	159	4.09	39
2012	119	2.85	42
2013	305	5.9	51
2014	123	4.36	29
2015	78	1.31	59
Total	1552	45.60	34

CPUE (fish/hour) of Asian Swamp Eels collected from Silver Lake 2008 – 2015.



Northern Snakehead

Cooper River Park Lake (Camden) – A boat electrofishing survey was completed at Cooper River Park Lake (150 acres) on August 3rd to evaluate the Largemouth Bass and Northern Snakehead populations. One adult Northern Snakehead measuring 600 mm (23.6 in) marks the second captured by NJDFW in 2015. The first Northern Snakehead encountered by NJDFW at this lake was in 2014 and measured 650 mm (35.6 in). This location is connected to the Delaware River, therefore it is no surprise to find them. A total of 38 Largemouth Bass were collected in 1.24 hours of electrofishing. There were 31 Largemouth Bass greater than the 200 mm stock size, resulting in a CPUE of 25 bass/hour. The PSD was 35 and RSD_{15} was19, indicating the population is unbalanced. An extensive dredging project is scheduled to begin during the fall of 2015. Stocking of additional young-of-the-year (YOY) Largemouth Bass is recommended after the dredging project is completed. Fluctuating water levels during spawning season have presumably affected reproduction.

Seasonal Technician Kyle Civalier holding a Northern Snakehead from Cooper River Lake

DOD Lake (Salem) – A boat electrofishing survey was completed at the DOD Lake (120 acres) on July 13th to evaluate the Largemouth Bass and Northern Snakehead populations. Two Northern Snakeheads were collected, measuring 320 mm (12.6 in) and 375 mm (14.8 in), both were the first to be captured in this Lake by NJDFW. Their presence was previously reported by an angler. Two additional Snakeheads were observed but escaped capture. Snakeheads are believed to have entered the lake through a pipe connecting directly to the Delaware River. A total of 45 Largemouth Bass were collected in 1.30 hours of electrofishing, 36 of which were greater than the 200 mm stock size. The CPUE for individuals greater than the 200 mm stock size was 27 bass/hour. The PSD was 69 and RSD_{15} was14, indicating the population is slightly unbalanced. In addition, two adult Bowfin and two adult Alewife were collected. DOD Lake has been stocked with both Muskellunge and Smallmouth Bass. Neither species were collected during sampling. The DOD Lake should only receive surplus Muskellunge and should be removed from the regular stocking list. The stocking of Smallmouth Bass should also be discontinued.

Oriental Weatherfish

The Oriental Weatherfish (Misgurnus anguillicaudatus), one of ten fish species regulated as an invasive species in NJ, was recently confirmed in a small tributary to the Neshanic River in Flemington. This marks the second watershed in which this common aquarium fish have been documented in NJ. The first documentation was in the Saddle River in 2001. NJDFW staff responded to an angler that reported catching three in a minnow trap.

Live Oriental Weatherfish (above)
Sexual dimorphism male on left and female on right (below)

Upon further field investigation, 73 Oriental Weatherfish have now been documented and removed by NJDFW staff at several locations, including adjacent tributaries, downstream in the Neshanic River, and approximately 11 miles downstream from the original encounter South Branch of the Raritan River at Studdiford Drive in Hillsborough Twp. This lack of containment within a pond or small tributary makes the success of any eradication plan highly unlikely. Further field sampling is necessary to determine the extent of their distribution within the watershed.

Aquatic Invasive Plant Management

Water chestnut, a non-native aquatic plant species that can rapidly colonize a waterbody once it is established, is becoming increasingly prevalent in New Jersey's waters. Early detection is the key to Water Chestnut control, since smaller populations are easier to eliminate than larger ones. It also costs less to control a small infestation because plants can be individually hand-pulled. A large population requires the use of mechanical harvesters or application of aquatic herbicides to achieve control. It can be difficult and costly to eradicate water chestnut given this plant's hardiness (seed pods remain viable for 10+ years) and abundance. Water chestnut is now found in approximately 23 waterbodies in 10 counties. Most new sightings are brought to our attention by anglers, who typically mention that they were made aware of the problem via recent invasive species articles in NJDFW's Freshwater Fisheries Digest. (Federal Grant F-48-R, Project I)

Water chestnut seed pods: immature (left) and mature (right).

Newly Identified Locations in 2015

Hyper Humus Ponds (Sussex) - Water Chestnut was observed at Hyper Humus Ponds located in the Paulins Kill Wildlife Management Area. Many individual plants were identified along with new and old seed pods found in the substrate of the pond. It is thought that Water Chestnut has been in this area for at least a couple of years as the area infested with the plants was quite large.

One of several of the Hyper Humus ponds in which Water Chestnut has established.

FISH HEALTH

Fish Health Rules

Fish Health testing requirements were expanded through formal rule making proposal in 2015. The changes include testing for major salmonid pathogens for trout regardless of the type of waterbodies being stocked, and requiring fish health testing for warmwater species. In an effort to reduce the risk of potential disease transfer into NJDFW's Pequest Trout Hatchery, the Pequest Trout Hatchery will be the only source of trout for the Pequest River Drainage beginning in 2016. The rule change is based upon recommendations made by a Blue Ribbon Panel for improving hatchery biosecurity. A review of stocking permits indicate only two organizations currently stock privately owned stream stretches with trout within the drainage. These two organizations will be provided surplus trout from the Pequest Trout Hatchery, at fair market value, to maintain current recreation within these areas. The use of trout as bait, which are often purchased from private fish culture facilities, will also be prohibited within the drainage.

The Pequest Trout Hatchery and the Hackettstown State Fish Hatchery were already established as the only sources of fish for the Pequest Wildlife Management Area and Trout Brook (Hackettstown), since Fish Health Regulations were incorporated into the Fish Code in 2008. New fish health regulations take effect March 2016.

Fish Kill Investigations

Field investigations are conducted in response to reports of fish kills, distressed fish, unknown fish parasites, or to address potential pathogen issues in wild fish. These investigations are often a collaborative effort between the Bureau of Freshwater Fisheries staff (Federal Grant F-48-R, Project II) and the fish pathologist in the NJDFW's Office of Fish and Wildlife Health and Forensics (under Grant FW-69-R administered by that Office). In 2015, the NJDFW's Office of Health and Forensics investigated ten fish kills, the Bureau of Freshwater Fisheries responded to fish kills at three waterbodies:

Assunpink Lake (Monmouth) - A fish kill was reported at Lake Assunpink on April 13th by anglers that were fishing in a bass tournament two days prior. On April 16th, 2015, Fish Pathologist Dr. Jan Lovy and Fisheries Biologist Chris Smith investigated the fish kill by boat. The kill was estimated to have affected several thousand fish mainly Bluegills. Small numbers of Pumpkinseed, Black Crappie, White Perch, and Largemouth Bass were also found dead. Fish were in various stages of decomposition, suggesting the kill was of an ongoing nature. Surface water chemistry data included a temperature of 15.5°C, dissolved oxygen of 9.39 mg/L (94% saturation), pH of 7.77, and specific conductivity of 134.1 µs/cm. Live Largemouth Bass, Bluegill, Pumpkinseed, White Perch, Black Crappie, and shiners were collected by electrofishing. All live fish examined appeared healthy with no external lesions. Fresh mortalities were collected from the lake and transported to the Fish Pathology Laboratory for necropsy.

The fish kill was the result of a systemic infection caused by the bacterium *Pseudomonas fluorescens*. *Pseudomonas fluorescens* is a bacterium common in the freshwater environment and has been reported as both a primary and secondary pathogen in multiple fish species. In Assunpink Lake, the kill was likely triggered by a combination of poor fish condition following the winter and the stress of warming water temperatures.

Lake Musconetcong (Morris/Sussex) – Fish kills have occurred in the past in this shallow 329-acre lake, following ice-out, that have been attributed to bacterial fish infections, exacerbated by stressful water quality conditions, due to winter draw-downs of the lake. Because of this recurring problem, water lowering permits were not issued for winter draw-downs in 2014-2015 and 2015-2016. To monitor water quality conditions under the ice, temperature/dissolved oxygen profiles were conducted at multiple locations on the lake on February 11 and 26, 2015. It was an unusually cold winter; ice thickness ranged from 9-11 inches and snow blanketed the ice. The water depth under the ice ranged from 3-5.5 ft, depending upon the survey location. The measurements recorded indicated generally favorable conditions with an acceptable range for fish survival, however, dissolved oxygen levels near the lake bottom at several locations dipped below 4 mg/L (and in one instance fell below 1 mg/L). No fish kills were observed (or reported by the public) in 2015.

Rahway River (Union) - Springfield Emergency Management's Deputy Coordinator reported "12 silvery, sucker-like fish" dead in the Rahway River. Photos revealed that they were, indeed, White Suckers, and it is suspected that spawning stress was the cause of the kill. No additional mortality was reported.

Weston Mill Pond (Middlesex) - A fish kill was reported by a New Brunswick municipal employee at Weston Mill Pond (one of two water intake sources treated by New Brunswick for drinking water) consisting of small numbers of fish dying over several weeks, starting in mid-January. It was explained that dead or dying alewives were frequently found in one of the pump basins on the side of the dam, though not in large numbers. He noted that recently higher numbers of moribund fish had been found on the pump debris screens, and unlike past occurrences additional species are now being found. Fisheries Technician Charles Sedor conducted a fish kill investigation on January 30 in which approximately twenty Alewives, five Black Crappies, and two Bluegills were recovered. It was also reported that one small bullhead, fewer than a dozen small Largemouth Bass, and one Chain Pickerel, approximately 15 inches in length, had also been found dead on the screen recently. Three other juvenile Chain Pickerel were found. The pathology report was negative for parasites and infections as reported by Dr. Jan Lovy. Water quality parameters such as dissolved oxygen, pH, conductivity and salinity were within normal freshwater levels. As the intake pump has been in operation for many years it is not believed to be the primary source of the mortality. It is suspected that some form of environmental stress (i.e. ice cover reducing oxygen levels or street salt runoff related to snow events) stressed the fish, which reduced their ability to elude the intake screen. The intake will continue to be monitored by New Brunswick Water Department staff.

Fish Salvages

Permitted fish salvages are necessary under a variety of circumstances, such as substantial water lowering events related to projects such as the dredging of a lake or a the repair of a dam. These salvages are typically conducted by trained private aquatic consultants and are conducted under controlled circumstances, during the more favorable conditions encountered in the fall and can be a relatively simple exercise. On the other hand, every year, as the result of a catastrophic dam failure or merely a minor leak, compounded with increased water temperatures and diminished oxygen levels during the summer, countless fish are threatened with demise. During emergency situations on state owned property such as Wildlife Management Areas or those managed by the Division of Parks and Forestry, the Bureau of Freshwater Fisheries may mobilize to conduct fish salvages to rescue fish and relocate them to suitable waters. (Hunter & Angler Fund)

No Fish Salvages were conducted by the Bureau of Freshwater Fisheries during 2015.

SURFACE WATER CLASSIFICATION

Surface Water Classification Assessments

Trout are useful bioindicators of stream health as excellent water quality and habitat are necessary for their survival and successful reproduction. In 1968, the Bureau of Freshwater Fisheries initiated the process of identifying and classifying New Jersey waters according to their suitability to support trout. Five years later, a classification system for New Jersey waters was developed. The Bureau's classification system, although already in use by various programs within the Department, was formally recognized in 1981 under the state's newly adopted *Surface Water Quality Standards* (SWQS).

Today, waters of the state are classified according to their suitability to support trout. Lakes are classified on their ability to support trout year round, whereas streams are classified on the occurrence of natural reproduction and the presence or absence of trout and/or trout associated species (Hamilton and Barno 2006). Ultimately, the more suitable a waterway is to supporting trout the higher the classification and the more protection it will receive. The Department's Land Use Regulation Program, through Stream Encroachment, Freshwater Wetlands, and the more recently developed storm water rules acknowledge the fragile nature of these ecosystems and provide additional protective measures.

Although a vast amount of work has been accomplished in classifying New Jersey waters, waters continue to be classified and reclassified according to their trout supporting capabilities, when justified by additional field investigation data collected by NJDFW. These data are interpreted and recommendations for surface water classification changes are provided to DEP's Bureau of Water Monitoring and Standards, Environmental Analysis Restoration and Standards, who ultimately integrate changes to the SWQS through an established rule making process. (Federal Grant F-48-R, Project I)

Double backpack electrofishing crew.

Stream Assessments for Surface Water Classification

During the summer months, a 150 meter section of stream is electrofished (single-pass) using one or more backpack electrofishing unit or a generator positioned on land or in a barge, with 2-3 hand-held anodes (Appendix C). All fish are captured and enumerated by species (total length measurements taken on all salmonids). Physicochemical parameters measured include water temperature, dissolved oxygen, pH, alkalinity, conductivity, specific conductance, and stream width, depth, and substrate type. The EPA Rapid Bioassessment habitat assessment protocol is used to assess in-stream habitat and riparian conditions (Barbour et al. 1999) with regional modifications (Appendix D). (Federal Grant F-48-R, Project I)

In 2015 three electrofishing surveys were conducted specifically for classification purposes by the Bureau under Grant F-48-R, Project I, all of which were on the Pohatcong Creek (Appendix A pages A44-A46). Data from 80 additional stream electrofishing surveys, also conducted in 2015

under a variety of other jobs and/or funding sources are valuable in confirming existing classification as well as identifying potential upgrades (Table 1, page 11).

In addition to recommending changes to existing surface water classifications, since 2006 NJDFW has reported surveys in which data confirm existing surface water classifications. The 2015 data confirmed the classifications of fifty-two stream segments, therefore no action is required (Table 4). At times, electrofishing surveys yield data that neither confirm an existing use (classification), nor warrant a change to the existing use (classification), as classifications are not downgraded unless proven the existing use can not be re-established. This was true for surveys at eighteen locations in 2015, therefore no action is required (Table 5).

Collectively, 13 stream surveys conducted in 2015 support potential surface water classification changes (Table 2). Recommended upgrades and/or acknowledgements include:

Beaver Brook (Clinton) (Hunterdon) – The extension of the *Trout Production* section of Beaver Brook (Clinton) downstream to the confluence with the South Branch of the Raritan River. This is based on data collected in 2015 as well as 2001 (Table 2 and Appendix A page A67).

Beden Brook (Somerset) - The data from a survey conducted on an unnamed tributary to Beden Brook (not previously sampled) verified it's existing default classification of *Non-Trout*. It is proposed that this tributary be identified and specifically listed by the Department as Beden Brook (Trib.) (Rocky Hill).

Lamington (Black) River (Morris/Somerset) - Significant changes are recommended to the Lamington (Black) River based on data from 13 surveys (2 in 2015, 6 in 2014, and 5 from 2003 through 2013) conducted by NJDFW (Table 2 and Appendix A pages A74 and A75). The specific stream sections on the Lamington River recommended for upgrade are described in Table 3.

Merrill Creek Reservoir (Warren) – A fisheries survey conducted on Merrill Creek Reservoir supports a previously recommended upgrade from *Trout Maintenance* to *Trout Production* (Table 2). During the period 1988 – 2012 the NJDFW annually stocked hatchery-reared Lake Trout (lakers) in Merrill Creek Reservoir. With the exception of the initial stocking in 1988, all lakers subsequently stocked were marked by removing a fin (referred to as a fin clip). During this 25 year period over 90,000 lakers, averaging 6.6 – 9.1 inches, were stocked in the reservoir. Unlike Brown and Rainbow Trout, Lake Trout are a long-lived trout species that is capable of spawning in a lake environment if suitable habitat is present. The reservoir's laker population has been surveyed annually since 1989 by the owner's consultant to obtain data needed to manage the recreational trout fishery. During these surveys each Lake Trout captured is examined for the presence/absence of a fin clip. Fish survey data from recent years shows an increasing prevalence of small lakers that do not have an identifying fin clip. These fish are too small to be attributed to the first year class of fish stocked in 1988 (that were not fin-clipped) indicating they are the product of natural reproduction, therefore warranting its upgrade from *Trout Maintenance* (FW2-TM) to *Trout Production* (FW2-TP(C1)) (Table 2). NJDFW discontinued stocking Lake Trout in the reservoir in 2013, because natural reproduction is considered sufficient to sustain the Lake Trout fishery without supplemental stockings.

Pohatcong Creek (Warren) - The extension of the *Trout Production* section of the Pohatcong Creek downstream from the Valley Road (a.k.a. Karrsville Road) bridge to the Route 31 bridge. This is based on surveys conducted on Pohatcong Creek since 2010 that document wild Brown Trout reproduction upstream of the Rt. 31 bridge (Appendix A pages A44-A46). These data (and data from surveys previously conducted on *Trout Production* streams statewide) will be used to determine if the *Wild Trout Stream* regulation should be modified and/or if new regulations for wild trout are warranted.

Raritan River South Branch (Morris/Hunterdon) - Additional surveys on the South Branch of the Raritan River and multiple tributaries were conducted that support previously recommended upgrades, that were proposed following the last rule adoptions in 2011.

TABLE 2.— Summary of recommended surface water classification changes supported by 13 surveys conducted in 2015 by NJDFW, plus data on Merrill Creek Reservoir. Reproducing trout species determined by the presence of young-of-the-year trout. A current surface water classification enclosed by brackets indicates a default surface water classification (i.e. the waterbody is not specifically listed in NJ's Surface Water Quality Standards, N.J.A.C. 7:9B). I.O. = Incidence of Occurrence; NA = Not Applicable (due to presence of trout reproduction).

Waterbody	Waterbody section	Midpoint of survey		Current surface water classification	Recommended surface water classification	I.O. value	Reproducing trout species	Survey date	Page
		Lat. (N)	Long. (W)						
Upper Delaware Region (Upper Delaware & Wallkill)									
Merrill Creek Reservoir (Harmony)	Entire Waterbody	40º44'03.0"	75º06'08.0"	FW2-TM	FW2-TP(C1) [e]	NA	Lake	NA	35
Pohatcong Creek (Pohatcong)	Karrsville bridge to Rt. 519 bridge, except tributaries listed separately	40º48'37.7"	74º56'04.0"	FW2-TM(C1)	FW2-TP(C1)	NA	Brown	7/9/15	A44
Pohatcong Creek (Pohatcong)	Karrsville bridge to Rt. 519 bridge, except tributaries listed separately	40º46'53.2"	74º58'26.0"	FW2-TM(C1)	FW2-TP(C1)	NA	Brown	7/9/15	A45
Raritan Region (Raritan, Arthur Kill, Raritan Bay, Shrewsbury, & Navesink)									
Beaver Brook (Clinton)	Lower most I-78 bridge downstream to, the South Branch of the Raritan River	40º38'13.9"	74º54'23.9"	FW2-TM	FW2-TP(C1)	NA	Brown	8/28/15	A67
*Beden Brook (Trib.) (Rocky Hill)	Entire length	40º23'21.8"	74º42'23.2"	[FW2-NT]	FW2-NT	16.4	none	9/2/15	A70
Lamington River (Black River) (Milltown)	Rt. 206 bridge to confluence with Rinehart Brook	40º44'44.8"	74º43'45.9"	FW2-TM(C1)	FW2-TP(C1)	NA	Brook [c] Brown & Rainbow [d]	8/5/15	A75
Raritan River S/Br (Mt. Olive)	Dam to confluence with Turkey Brook [b]	40º50'21.4"	74º44'49.9"	FW2-TM	FW2-TP(C1)	NA	Brown	8/14/15	A81
Raritan River S/Br (Califon)	Rt. 512 bridge to downstream end of Packers Island, except segment described separately, below [b]	40º42'42.4"	74º51'19.2"	FW2-TM	FW2-TP(C1)	NA	Brook [c] & Brown	7/8/15	A85
Raritan River S/Br (Ken Lockwood Gorge)	River and tributaries within Ken Lockwood Gorge WMA [b]	40º42'7.5"	74º52'4.8"	FW2-TM(C1)	FW2-TP(C1)	NA	Brook [c] Brown & Rainbow [c]	7/20/15	A86

Raritan River S/Br (Ken Lockwood Gorge)	River and tributaries within Ken Lockwood Gorge WMA [b]	40º41'47.2"	74º52'18.2"	FW2-TM(C1)	FW2-TP(C1)	NA	Brown	7/20/15	A87
*Raritan River S/Br (Trib.) (Drakestown)	Entire length	40º51'9.5"	74º46'01.4"	[FW2-NT]	FW2-TP(C1) [a]	NA	Brook	7/14/15	A89
*Raritan River S/Br (Trib.) (SW of Budd Lake)	Entire length	40º51'25.0"	74º46'00.1"	[FW2-NT]	FW2-TP(C1) [a]	NA	Brook	7/9/15	A90
*Raritan River S/Br (Trib.) (Warmwater)	Entire length	40º50'46.0"	74º45'21"	[FW2-NT]	FW2-TM	21.7	none	8/14/15	A91

[a] Potential change also supported by survey data collected in 2011 and previously submitted to NJDEP Water Monitoring and Standards Survey in Memo dated March 11, 2013, titled Recommended Changes to Individual Surface Water Quality Classifications.

[b] New boundaries suggested in Memo titled Recommended Changes to Individual Surface Water Quality Classifications (March, 11 2013).

[c] Young-of-the-year trout not present, however trout from older year classes present.

[d] Seven Rainbow Trout measuring 134 - 182 mm were collected. It is unknown if the fish were of wild origin, as they may have been stocked as part of the Trout I The Classroom program.

[e] Potential change also supported by survey data and recommendation report titled "2014 Investigation & Management of NJ's Freshwater Fisheries Resources."

* Indicates unnamed tributary as recognized by SWQS. Name given is recommended by NJDFW.

TABLE 3.— Summary of recommended surface water classification changes to the Lamington River (Black River) supported by 13 surveys (2 in 2015, 6 in 2014, and 5 from 2003 through 2013) conducted by New Jersey Division of Fish and Wildlife.

Current segment description	Current SWQS classification	Recommended segment description	Recommended SWQS classification
(Succasunna) - Source to Rt. 206 bridge	FW2-NT(C1)	(Mine Hill Township) - Source to but not including Mine Hill Lake, including all tributaries	FW2-TP(C1)
		(Succasunna) –Mine Hill Lake to Rt. 206 bridge	FW2-NT(C1)
(Milltown) - Rt. 206 bridge to confluence with Rinehart Brook	FW2-TM(C1)	(Milltown) - Rt. 206 bridge to confluence with Trout Brook	
(Pottersville) - Confluence with Rinehart Brook to Camp Brady bridge, Bedminister	FW2-TP(C1)	(Pottersville) - Confluence with Trout Brook to River Road West, including all tributaries	FW2-TP(C1)
(Vliettown) - Camp Brady bridge to confluence with Cold Brook	FW2-TM		
(Oldwick) – Confluence with Cold Brook to the Route 523 bridge, including all tributaries	FW2-TM(C1)		
(Burnt Mills) –Route 523 bridge to North Branch, Raritan River, including all tributaries	FW2-NT(C1)	(Branchburg) River Road West to North Branch, Raritan River, including all tributaries	FW2-NT(C1)

TABLE 4.— Electrofishing surveys conducted in 2015 by NJ Division of Fish & Wildlife that *confirm existing surface water classifications* as indicted in New Jersey's Surface Water Quality Standards, N.J.A.C. 7:9B. No action is required. Reproducing trout species is determined by the presence of young-of-the-year trout. Data are found in report titled "2015 Investigation & Management of NJ's Freshwater Fisheries Resources."

Waterbody	Waterbody section	Midpoint of survey		Current surface water classification confirmed	I.O. value	Reproducing Trout Species	Date	Page
		Lat. (N)	Long. (W)					
Southern Region (Lower Delaware River and Lower Atlantic Coastal)								
Masons Run (Pine Hill)	Source to Little Mill Road	39º47'26.0"	75º00'19.0"	FW2-TP(C1)	NA	Brook	8/18/15	A3
Upper Delaware Region (Upper Delaware & Wallkill)								
Bear Creek (Frelinghuysen)	Erie-Lackawanna Railroad trestle to confluence with Trout Brook, including all unnamed and unlisted tributaries	40º55'48.9"	74º53'05.9"	FW2-TM(C1)	26.2	Brook [a]	8/13/15	A4
Beatty's Brook (Penwell)	Entire length	40º46'31.4"	74º53'30.5"	FW2-TP(C1)	NA	Brook & Brown [a]	7/31/15	A5
Beerskill Creek (Shawytown)	Boundary of High Point State Park to confluence with Little Flat Brook	41º15'34.9"	74º47'34.6"	FW2-TP(C1)	NA	Brook	7/28/15	A6
Bowers Brook (Hackettstown)	Source downstream to Rt. 517	40º52'12.0"	74º49'42.2"	FW2-TP(C1)	NA	Brook	7/29/15	A10
Brass Castle Creek (Brass Castle)	Entire length	40º46'04.1"	75º01'55.3"	FW2-TP(C1)	NA	Brook	7/30/15	A11
Brass Castle Creek (Brass Castle)	Entire length	40º45'27.6"	75º00'55.8"	FW2-TP(C1)	NA	Brown	8/12/15	A12
Criss Brook (Stokes State Forest)	Entire Length within the boundries of Stokes State Forest	41º13'41.0"	74º46'09.5"	FW2-TP(C1)	NA	Brook	8/12/15	A13
Flat Brook (Walpack)	Flatbook-Roy Wildlife Management Area boundary to the Delaware River, except segments described below	41º11'05.9"	74º51'09.1"	FW2-TM(C1)	34.6	Brook [a]	7/16/15	A14
Forked Brook (Stokes State Forest)	Entire length	41º14'20.9"	74º44'42.3"	FW2-TP(C1)	NA	Brook	7/28/15	A15
Hakihokake Creek (Trib) (Wydner)	Source to confluence with Hakihokake Creek west of York Road	40º35'23.5"	75º05'42.5"	FW2-TP(C1)	NA	Brown	8/10/15	A17
Lopatcong Creek (Phillipsburg)	Source to a point 560 feet (straight line distance) upstream of the Penn Central railroad track, including all tributaries	40º43'22.0"	75º08'42.0"	FW2-TP(C1)	NA	Brown	8/12/15	A23

Lopatcong Creek (Phillipsburg)	Source to a point 560 feet (straight line distance) upstream of the Penn Central railroad track, including all tributaries	40º40'59.5"	75º09'45.3"	FW2-TP(C1)	NA	Brown	7/22/15	A24
Lopatcong Creek (Phillipsburg)	Source to a point 560 feet (straight line distance) upstream of the Penn Central railroad track, including all tributaries	40º40'42.2"	75º10'04.9"	FW2-TP(C1)	NA	Brown	7/22/15	A25
Mine Brook (Mt. Olive)	Lower Mine Brook Reservoir outlet downstream to Drakestown Road bridge	40º51'20.9"	74º47'51.3"	FW2-TP(C1)	NA	Brook	8/20/15	A29
Musconetcong River (Hackettstown)	Saxton Lake to the Delaware River, including all unnamed and unlisted tributaries	40º45'41.7"	74º54'58.7"	FW2-TM	27.7	Brook [a] & Brown [a]	7/23/15	A31
Papakating Creek (Wantage)	Route 629 bridge to Lehigh & New England RR crossing in Wantage Twp, including all tribs, except trib east of Roys, Lake Windsor trib, & the trib that drains into Papakating Creek immediately upstream of the Lehigh & New England RR crossing in Wantage Twp.	41º10'08.1"	74º39'22.2"	FW2-NT(C1)	9.4	none	8/20/15	A33
Shabakunk Creek (Ewing)	Entire length	40º16'02.3"	74º46'18.0"	FW2-NT	10.4	none	9/3/15	A47
Spring Mills Brook (Milford)	Entire length	40º35'27.4"	75º06'58.2"	FW2-TP(C1)	NA	Brown	8/10/15	A49
Stephensburg Brook (Stephensburg)	Entire length	40º47'34.7"	74º52'16.6"	FW2-TP(C1)	NA	Brook & Brown	7/13/15	A50
Stony Brook (Stokes State Forest)	Outlet of Stony Lake to the confluence with Big Flat Brook	41º12'53.5"	74º46'58.0"	FW2-TP(C1)	NA	Brook	8/12/15	A51
Van Campens Brook (Millbrook)	Entire length	41º04'15.2"	74º57'55.6"	FW2-TP(C1)	NA	Brook & Rainbow	7/24/15	A53
Van Campens Brook (Millbrook)	Entire length	41º04'06.4"	74º58'33.1"	FW2-TP(C1)	NA	Brook & Rainbow [a]	8/18/15	A54
Van Campens Brook (Millbrook)	Entire length	41º03'32.1"	74º59'44.0"	FW2-TP(C1)	NA	Brown	8/18/15	A55
Van Campens Brook (Millbrook)	Entire length	41º03'28.8"	75º00'15.1"	FW2-TP(C1)	NA	Brook [a] & Brown	7/24/15	A56
West Portal Creek (West Portal)	Entire length	40º40'52.7"	75º01'49.1"	FW2-TP(C1)	NA	Brown	8/27/15	A57

Passaic Region (Passaic, Hackensack, & Hudson) and Upper Atlantic								
Bear Swamp Brook (Mahwah)	Entire length	41º04'34.5"	74º13'09.7"	FW2-TP(C1)	NA	Brook	8/17/15	A58
Black Brook (Great Swamp)	Segment and tributaries within the Great Swamp National Wildlife Refuge	40º41'51.8"	74º30'02.7"	FW2-NT(C1)	5.3	none	8/14/15	A59
Hibernia Brook (trib)(Lake Ames)	Sourse to, but not including, Lake Ames	40º57'07.9"	74º30'22.2"	FW2-TP(C1)	NA	Brook	7/21/15	A60
Indian Grove Brook (Bernardsville)	Entire length	40º44'38.5"	74º33'53.5"	FW2-TP(C1)	NA	Rainbow	8/3/15	A61
Mill Brook (Randolph)	Source to Route 10 bridge, including all tributaries	40º51'33.6"	74º33'55.7"	FW2-TP(C1)	NA	Brown	8/3/15	A62
Passaic River (Mendham)	Source downstream to, but not including, Osborn Pond or tributaries described separately below	40º44'30.0"	74º32'56.1"	FW2-TP(C1)	NA	Brown & Rainbow	8/14/15	A63
Pequannock River (trib)(Copperas Mtn)	Entire length	41º01'50.2"	74º27'25.2"	FW2-TP(C1)	NA	Brook & Brown	8/17/15	A64
Primrose Brook (Harding)	Source to Lees Hill Road bridge	40º45'45.8"	74º31'44.8"	FW2-TP(C1)	NA	Brook	7/22/15	A65

Raritan Region (Raritan, Arthur Kill, Raritan Bay, Shrewsbury, & Navesink)								
Beden Brook (Montgomery)	Entire length	40º23'04.2"	74º44'21.5"	FW2-NT	10.1	none	9/3/15	A68
Beden Brook (Montgomery)	Entire length	40º24'18.3"	74º41'00.7"	FW2-NT	10.3	none	9/2/15	A69
Black Brook (Polktown)	Entire length	40º39'39.0"	74º56'54.6"	FW2-TP(C1)	NA	Brown	7/7/15	A71
Hickory Run (Califon)	Entire length	40º42'55.8"	74º51'45.5"	FW2-TP(C1)	NA	Brook	7/9/15	A72
India Brook (North Branch, Raritan River) (Randolph)	Entire length	40º47'06.9'	74º37'09.5"	FW2-TP(C1)	NA	Brown	8/26/15	A73
Mulhockaway Creek (Pattenburg)	Entire length	40º38'49.7"	74º58'12.1"	FW2-TP(C1)	NA	Brook [a] & Brown	8/12/15	A76
Neshanic River (Reaville)	Entire length	40º27'57.0"	74º47'36.7"	FW2-NT	7.0	none	8/6/15	A77
Raritan River N/Br (Pleasant Valley)	Source to, but not including, Ravine Lake	40º46'30.5"	74º37'27.8"	FW2-TP(C1)	NA	Brown	8/26/15	A78
Raritan River N/Br (Pleasant Valley)	Source to, but not including, Ravine Lake	40º44'47.3"	74º37'59.6"	FW2-TP(C1)	NA	Brown	9/4/15	A79

Raritan River S/Br (Middle Valley)	Confluence with Turkey Brook to Rt. 512 bridge [b]	40º48'52.6"	74º43'44.2"	FW2-TP(C1)	NA	Brook & Brown	7/27/15	A82
Raritan River S/Br (Middle Valley)	Confluence with Turkey Brook to Rt. 512 bridge [b]	40º47'06.4"	74º46'45.0"	FW2-TP(C1)	NA	Brook Brown & Rainbow	7/20/15	A83
Raritan River S/Br (Middle Valley)	Confluence with Turkey Brook to Rt. 512 bridge [b]	40º44'30.3"	74º49'28.2"	FW2-TP(C1)	NA	Brook Brown & Rainbow	7/8/15	A84
Rinehart Brook (Hacklebarney)	Entire length	40º44'40.0"	74º44'10.0"	FW2-TP(C1)	NA	Brown	7/6/15	A93
Rocky Run (Lebanon)	Entire length	40º41'41.0"	74º54'36.9"	FW2-TP(C1)	NA	Brook	7/9/15	A94
Stony Brook (Washington)	Entire length	40º47'49.6"	74º45'17.3"	FW2-TP(C1)	NA	Brook Brown & Rainbow	7/13/15	A95
Trout Brook (Hacklebarney)	Entire length	40º45'05.0"	74º43'52.5"	FW2-TP(C1)	NA	Brook	7/6/15	A97
Turkey Brook (Mt. Olive)	Entire length	40º50'18.7"	74º44'29.7"	FW2-TP(C1)	NA	Brook & Brown	7/2/15	A98
Willhoughby Brook (Buffalo Hollow)	Entire length	40º40'18.5"	74º54'49.5"	FW2-TP(C1)	NA	Brook [a] & Brown	7/7/15	A99

[a] Young-of-the-year trout not present, however trout from older year classes present.
[b] New boundaries suggested in Memo titled Recommended Changes to Individual Surface Water Quality Classifications (March, 11 2013).

TABLE 5.— Electrofishing surveys conducted in 2015 by NJ Division of Fish & Wildlife that *neither confirm an existing use (classification), nor warrant a change to the existing use,* as classifications are not downgraded unless proven the existing use can not be re-established. Reproducing trout species is determined by the presence of young-of-the-year trout. Data are found in report titled "2015 Investigation & Management of NJ's Freshwater Fisheries Resources."

Waterbody	Waterbody section	Midpoint of survey		Current surface water classification	I.O. value	Reproducing Trout Species	Date	Page
		Lat. (N)	Long. (W)					
Southern Region (Lower Delaware River and Lower Atlantic Coastal)								
Masons Run (Pine Hill)	Source to Little Mill Road	39º47'21.0"	75º00'06.0"	FW2-TP(C1)	NA	Brook [a]	8/18/15	A2
Upper Delaware Region (Upper Delaware & Wallkill)								
Big Flat Brook (Sandyston)	Confluence with Parker Brook, through the Blewitt Tract, to the confluence with Flat Brook, except tributaries described under the listing for Flat Brook, below	41º12'23.4"	74º48'12.1"	FW2-TP(C1)	37.2	Brook [a]	7/14/15	A7
Big Flat Brook (Sandyston)	Confluence with Parker Brook, through the Blewitt Tract, to the confluence with Flat Brook, except tributaries described under the listing for Flat Brook, below	41º11'54.9"	74º49'05.1"	FW2-TP(C1)	27.3	none	7/16/15	A8
Big Flat Brook (Sandyston)	Confluence with Parker Brook, through the Blewitt Tract, to the confluence with Flat Brook, except tributaries described under the listing for Flat Brook, below	41º11'30.6"	74º50'34.6"	FW2-TP(C1)	28.6	Brook [a]	7/14/15	A9
Clove (Mill) Brook (Montague)	Lake Marcia outlet to State line, except tributaries described below	41º20'54.5"	74º41'24.3"	FW2-TP(C1)	25.9	Brown [a]	8/13/15	A26
Clove (Mill) Brook (Montague)	Lake Marcia outlet to State line, except tributaries described below	41º18'45.8"	74º42'24.2"	FW2-TP(C1)	29.6	Brook [a]	8/13/15	A27
Franklin Pond Creek (Hardyston)	Source to, but not including, Franklin Pond	41º06'6.9"	74º34'41.1"	FW2-TP(C1)	26.6	none	7/21/15	A16
Hances Brook (Rockport)	Entire length	40º48'18.7"	74º51'35.9"	FW2-TP(C1)	25.0	Brook [a]	7/29/15	A18
Knowlton Brook (Knowlton)	Entire length	40º53'28.5"	75º03'14.6"	FW2-TP(C1)	44.2	Brown [a]	8/18/15	A19
Mine Brook (Mt. Olive)	Source to, but not including, Upper Mine Brook Reservoir, downstream to Lower Mine Brook Reservoir outlet	40º51'25.8"	74º47'39.2"	FW2-TM	15.5	none	8/21/15	A28

Musconetcong River (Hackettstown)	Saxton Lake to the Delaware River, including all unnamed and unlisted tributaries	40º46'13.5"	74º54'20.9"	FW2-TM	13.1	none	7/23/15	A30
Parker Brook (Montague)	Entire length	41º14'36.9"	74º43'58.6"	FW2-TP(C1)	21.3	Brook [a]	7/6/15	A34
Pohatcong Creek (Pohatcong)	Karrsville bridge to Rt. 519 bridge, except tributaries listed separately	40º40'44.0"	75º06'29.0"	FW2-TM(C1)	NA	Brown	7/7/15	A46
Sparta Glen Brook (Sparta)	Entire length	41º02'18.8"	74º36'56.8"	FW2-TP(C1)	50.1	Brook [a]	7/21/15	A48
Stony Brook (Stokes State Forest)	Outlet of Stony Lake to the confluence with Big Flat Brook	41º12'19.4"	74º46'26.2"	FW2-TP(C1)	17.6	none	7/6/15	A50
Passaic Region (Passaic, Hackensack, & Hudson) and Upper Atlantic								
Rockaway River (trib) (W of Longwood Lake)	Entire length, including all tributaries	40º59'51.9"	74º31'55.9"	Proposed [b] FW2-TP(C1)	NA	none	7/21/15	A66
Raritan Region (Raritan, Arthur Kill, Raritan Bay, Shrewsbury, & Navesink)								
Lamington River (Black River) (Milltown)	Rt. 206 bridge to confluence with Rinehart Brook	40º46'12.4"	74º43'26.1"	FW2-TM(C1)	17.0	none	8/5/15	A74
Sun Valley Brook (Mt. Olive)	Entire length	40º51'01.8"	74º45'24.0"	FW2-TP(C1)	23.0	none	7/2/15	A96

[a] Young-of-the-year trout not present, however trout from older year classes present.

[b] Current classification is FW2-NT(C1), however data from 2009 was used to recommend FW2-TP(C1) in 2011.

Lake Assessments for Surface Water Classification

As part of the continued assessment of New Jersey waters dissolved oxygen and temperature profiles are performed to determine a lake's ability to support trout throughout the harsh summer months. During the summer most New Jersey lakes deeper than 3 m (10 ft) thermally stratify. The epilimnion (surface waters) become too warm to support coldwater fishes (trout), and the metalimnion and hypolimnion (middle and bottom waters), while often cold enough for trout, often have dissolved oxygen levels too low to support trout (and other fish species). Only deep lakes (generally at least 15 m (50 ft) deep), that are not overly eutrophic, maintain sufficient levels of dissolved oxygen in some portion of the strata below the epilimnion during the summer and early fall. A water temperature and dissolved oxygen profile is conducted in the deepest part of a lake using a YSI meter with cable marked in one-foot increments. Measurements are generally taken at 5 to 10 foot intervals, but more frequently (1-ft increments) when marked changes are observed (typically in the metalimnion). A secchi disk (also marked in one-foot increments) is used to measure water transparency. The criteria used to determine trout-supporting water is water temperature $\leq$ 21ºC (69.8ºF) and dissolved oxygen $\geq$ 4 mg/L (Appendix C). If criteria are met, Lakes and reservoirs are classified as *Trout Maintenance* and they are classified as *Non-Trout* if they are not met. The presence and amount of trout supporting water can vary from year to year, depending on air temperature and rainfall. Shallow lakes, particularly those less than 50 feet deep, often have little or no trout supporting water during the summer due to anoxic conditions in their colder bottom waters and warm surface waters.
(Federal Grant F-48-R, Project I)

Three water temperature and dissolved oxygen profiles were conducted during 2015 that can be used to assess the current Surface Water classifications (Table 6).

Iliff Lake (Sussex) - This 32-acre lake is owned by Andover Twp. and is classified as *Trout Maintenance*. A profile was conducted on August 28 in the deepest part of the lake (30 ft max depth). Trout supporting water was documented at 14 ft below the surface. Above that depth the water was too warm (>21°C) and below that depth dissolved oxygen was too low (<4 mg/L) to support trout. (Appendix B page B2)

South Vineland Park Pond (Cumberland) – A dissolved oxygen temperature profile was completed at this 17-acre pond on July 30th. Although currently classified as *Non-Trout*, previous profiles suggested that trout supporting water may exist during the summer. Trout supporting temperatures and dissolved oxygen were not present on this date. Limited fish supporting water exists in depths greater than 10 feet. Another profile will be completed in 2016. (Appendix B page B4)

Tilcon Lake (Morris) - This 88-acre lake lies within Allamuchy Mtn. State Park, in the Musconetcong River watershed. The lake is not specifically listed in NJ's SWQS and therefore assumes a *Non-Trout* classification by default because it is over five acres. Profiles conducted in previous years (2013 and 2014) have documented trout supporting water. Subsequently, a recommendation was submitted to the NJDEP Bureau of Water Quality Standards and Assessment in 2011 to suggest its upgrade from *Non-Trout* to *Trout Maintenance*, however it has not been changed as of December 2015. This lake is also stocked with Landlocked Salmon. A profile was conducted on August 28 in the deepest part of the lake (50 ft max depth), in which

trout supporting water was documented from 21 ft below the surface down to 45 ft. (Appendix B page B3)

TABLE 6.— Summary of 3 temperature & dissolved oxygen profiles conducted during the summer months on lakes in 2015. Results page number references in *2015 Investigations & Management of NJ's Freshwater Fisheries Resources Report*.

Waterbody (County)	Current surface water classification	Depth (ft) of water capable of supporting trout [a]	Recommended classification change	Date	Page
Southern Region (Lower Delaware River and Lower Atlantic Coastal)					
South Vineland Park Pond (Cumberland)	FW2-NT	none	no (current confirmed)	7/30/15	B4
Upper Delaware Region (Upper Delaware & Wallkill)					
Iliff Lake (Sussex)	FW2-TM(C1)	14	confirmed	8/25/15	B2
Tilcon Lake (Morris)	FW2-NT	21 - 45	FW2-TM (also recommended in 2011 based on 2007 data)	8/25/15	B3

[a] Depth measured from the surface; criteria for trout supporting water: water temperature $\leq$ 21ºC and dissolved oxygen $\geq$ 4 mg/L.

ANGLER USE ASSESSMENT

Angler Surveys

Opening Day Trout Angler Survey

NJDFW's trout stocking programs provide Garden State anglers with many opportunities to fish for trout throughout the year. Under Fish and Wildlife's spring stocking program, nearly 200 streams, ponds, and lakes throughout the state are stocked with 570,000 trout annually. The opening day of the trout season each April is greatly anticipated by anglers, who flock to these waters to fish for trout on this eventful day. To assess angler turnout and success on this important recreational day, angler counts, and interviews are conducted on various trout-stocked waters. Information on angler participation and satisfaction is used to assess trout stocking and to make program changes. (Federal Grant F-48-R, Project III)

Since 2004 the NJDFW's Wildlife Conservation Corps (WCC) volunteers have provided a valuable service by assisting with the collection of angler data on *Opening Day*. Each volunteer is assigned a trout-stocked water and provided with written instructions on how to conduct the survey, data forms, and information about their assigned waterbody. Volunteers are also asked to submit digital pictures of anglers fishing, catching fish, and holding up their catch for display, as well as a panoramic view that would be indicative of the angler turnout. Not only do the volunteers obtain much needed information regarding trout angler activity, but their visible presence has also reaped several unexpected benefits. For many anglers, this is often their first contact with a NJDFW representative. Anglers are generally willing to provide information about their fishing experience, and many are pleased to see Fish and Wildlife taking an active role in managing the waterbody they are fishing. The WCC volunteers that participate also had positive experiences, with several commenting that this was their first opportunity to assist the NJDFW and they had fun doing it. In 2013 NJDFW began funding this survey under the Sport Fish Restoration Program (Federal Grant F-48-R, Project III) and the volunteer hours are used as state matching funds.

The Opening Day of the 2015 trout season was Saturday, April 4th and the angler survey was conducted on this day from 8 a.m. - 12 p.m. The weather was partly sunny and windy in many locations. Of the 38 surveys conducted and completed, 33 were on lakes and ponds. On the 33 lakes and ponds surveyed, 2,109 anglers were observed fishing (an average of ~64 anglers per waterbody).

This year the Division of Fish and Wildlife stocked only Rainbow Trout as they were more resistant to becoming symptomatic with the disease that affected Pequest Hatchery last year, Furunculosis. However, if we were to stock only one species of trout, Rainbow Trout was a fortunate constraint, as anglers find them easier to catch, and the empirical data collected thus far, they prove to be superior in terms of their activity, aggressiveness, and readiness to bite a hook.

List of lakes and ponds included in the angler survey in 2015, sorted from largest to smallest angler turnout.

County	Waterbody	BB[1]	Total # of Anglers	Total # of Trout Caught
Monmouth	Spring Lake		600	300
Burlington	Sylvan Lake	X	143	85
Essex	Verona Park Pond		122	43
Bergen	Dahnert's Lake		100	71
Monmouth	Echo Lake	X	100	51
Monmouth	Holmdel Park Pond	X	86	53
Gloucester	Grenloch Lake		79	17
Atlantic	Hammonton Lake		77	22
Cape May	Ponderlodge Pond	X	73	35
Cumberland	Shaws Mill Pond		72	39
Morris	Burnham Park Pond		60	36
Camden	Haddon Lake		58	17
Middlesex	Roosevelt Park Pond		53	1
Union	Nomahegan Park Pond		45	17
Somerset	Spooky Brook Park Pond	X	43	36
Burlington	Pemberton Lake		42	4
Hunterdon	Amwell Lake	X	39	15
Mercer	Rosedale Lake		35	4
Morris	Speedwell Lake		32	36
Warren	Blair Lake		31	12
Essex	Diamond Mill Pond		30	48
Mercer	Colonial Lake		28	2
Hunterdon	Manny's Pond		27	1
Atlantic	Heritage Pond		25	3
Burlington	Crystal Lake		23	2
Morris	Lake Musconetcong		23	8
Warren	Columbia Lake		20	16
Ocean	Lake Shenandoah		16	1
Essex	Branch Brook Park Pond		13	20
Sussex	Alms House Pond[2]		7	4
Middlesex	Lake Papaianni		7	0
Warren	Mountain Lake		0	0
Sussex	Stony Lake		0	0

[1]Bonus Broodstock Waterbodies

[2]Not a full survey (see appendix)

Since 2012 the Bureau has been collecting data on which trout stocked species is easiest to catch, or more readily gets caught, and again in 2015, the Bureau was interested in data to assess catch rates. Surveys were conducted at waterbodies that were stocked with Rainbow Trout in 2014 and 2015 (our control group), and in addition, waterbodies that were stocked with Brown Trout in 2014 and Rainbow Trout in 2015 (our experimental group) to determine if catch rates increased based on switching to Rainbow Trout in 2015.

The metric (1) used to compare catch rates accounted for the different preseason trout allocations between 2014 and 2015 and also fishing pressure:

(1) **Catch Rate per Allocated Trout** = (Trout Caught Per Angler/Preseason Trout Allocation) * 10000)

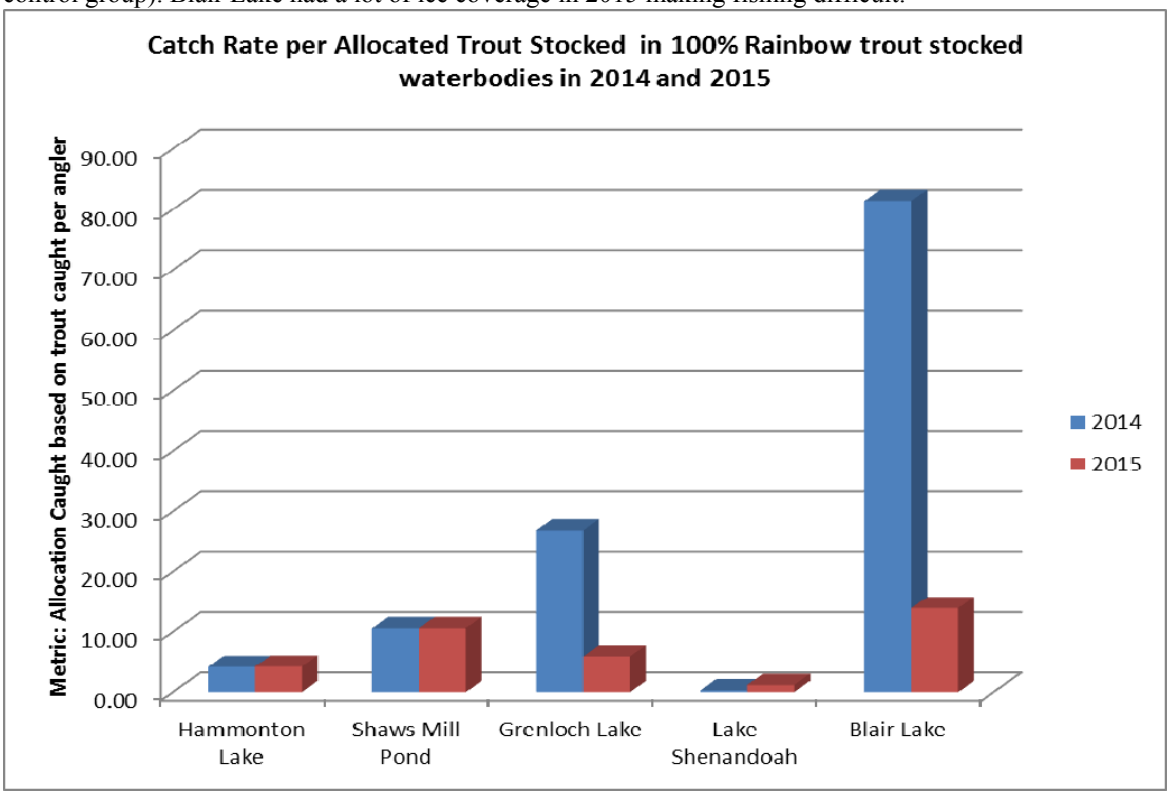
The control showed that there was either similar Catch Rate per Allocated Trout in 2014 and 2015 or that 2014 Catch Rate per Allocated Trout was higher (at Blair Lake, higher Catch Rate per Allocated Trout in 2014 was due in part because of ice coverage on the lake in 2015). For the experimental group, the Catch Rate per Allocated Trout was better on every waterbody, except Rosedale Lake, in 2015 (Figure 4). This data indicates that despite bad weather, windy conditions, and ice coverage on many waterbodies in 2015, stocking Rainbow Trout instead of Brown Trout overcame these disadvantages and gave anglers a better opportunity to catch trout.

The opening day angler counts in 2015 reflected a good angler turnout, higher than the average in 2014. Spring Lake had the largest showing with about 600 anglers wetting their lines. Overall, and despite a windy morning, angler turnout was high. Fishing was reportedly difficult on many waters across the state because of the windy conditions, ice, or high water on streams. Many anglers were discouraged but reports of trout fishing action increased in the following weeks.

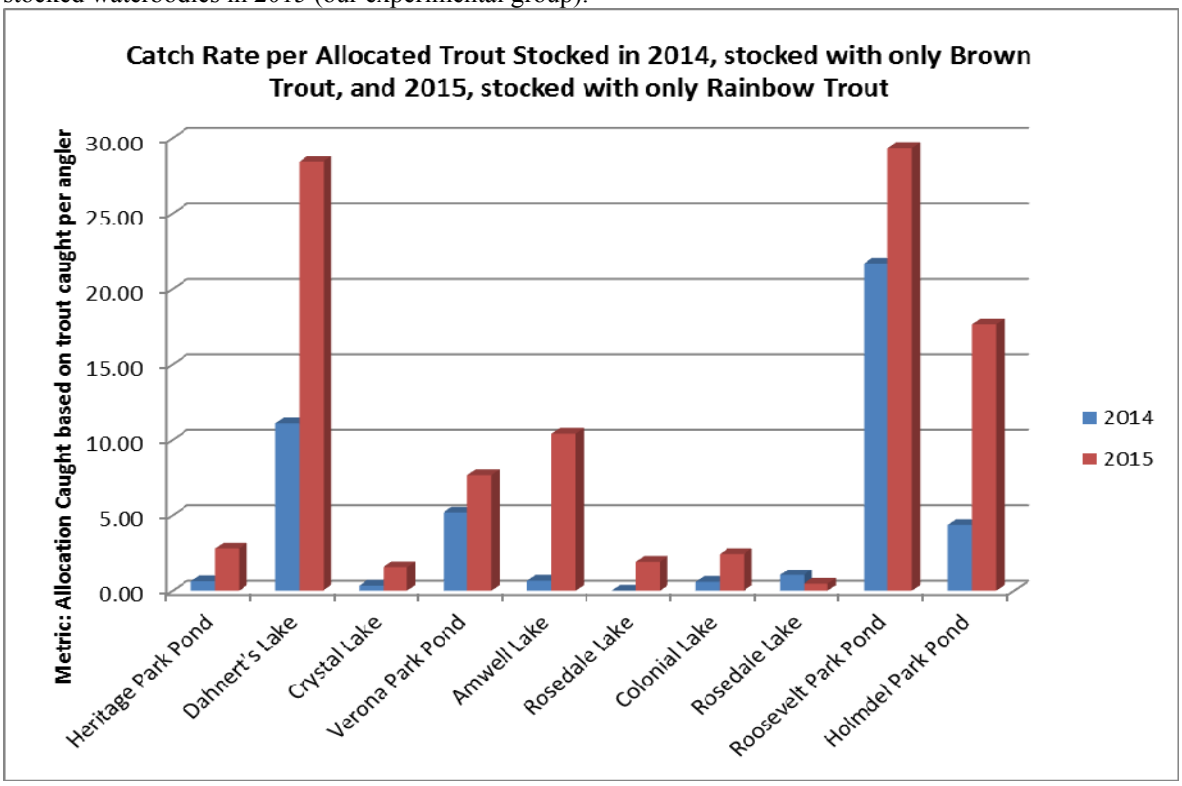
Fishing was great in some locations, such as, Diamond Mill Pond, where over 1.5 trout were caught per angler on the waterbody. Impressive numbers of trout were caught in some locations when considering the allocated number of trout and trout caught. For example, 28%, 25%, 20%, 15%, and 15% of the allocated trout at Dahnert's Lake, Holmdel Park Pond, Sylvan Lake, Diamond Mill Pond, and Echo Lake, were caught, respectively. Considering these surveys are conducted in a 4 hour span of time on opening day and that not all trout caught are noticed by survey clerks (especially when turnouts are larger), trout in these locations were very "active."

The complete report with additional data (i.e. stream surveys, complete discussions, angler survey questions) for the 2015 Opening Day Trout Angler Survey can be found in **Appendix H**. (Federal Grant F-48-R, Project III)

A comparison of Catch Rate per Allocated Trout on Rainbow Trout stocked waterbodies in 2014 and 2015 (our control group). Blair Lake had a lot of ice coverage in 2015 making fishing difficult.



A comparison of Catch Rate per Allocated Trout on Brown Trout stocked waterbodies in 2014 and Rainbow Trout stocked waterbodies in 2015 (our experimental group).



Paulins Kill Angler Survey - Angler Creel Survey was conducted on the Paulins Kill in conjunction to the fish sampling efforts. Four students from Warren County Community College have spent approximately 125 hours on 31 days interviewing anglers on their experience and opinions on the Paulins Kill from April 12th through June 15th 2015. Data from this survey is currently being analyzed.

South Branch of the Raritan River Angler Survey – An angler creel and preference survey was developed by NJDFW staff and implemented by a WCC Volunteer (Jeffery Kurt for a Rutgers Environmental Stewards Class) and NJDFW staff for a section of the South Branch of the Raritan River. The survey was intended to gather angler use, catch information, and preference in regards to stocking and regulations. The survey was intended to focus on the South Branch of the Raritan River from Mount Olive downstream to the Ken Lockwood Gorge Catch and Release Artificial Only section. The duration spanned primarily the seven in-season stocking period (surveys conducted from April 4 through June 30), with additional surveys conducted into the Fall of 2015. In total, 143 individual anglers were surveyed, with 9 anglers taking the survey for a second time in order to obtain additional creel data.

During this survey, a total of 681 trout were caught (647 Rainbows, 30 Browns, and 4 Brook Trout), yielding a combined CPUE of 2.35 trout per hour. Spin fishermen outnumbered fly anglers 89 to 61, while only 2 anglers considered themselves both. Anglers fish the South Branch an average of 22.6 days per year. Not surprisingly, the highest number of days fished during each of the four major seasons occurred during the spring with 8.4 days over the 7-week stocking season. Anglers were surveyed in each of the following six study areas: 1) Flanders-Drakestown Road to the Bartley WMA (n=26), 2) Claremont Stretch (YTCA) (n=5), 3) Long Valley to Scott Park (n=23), 4) Vernoy to Califon Dam (n=26), 5) Califon Dam to Hoffmans Crossing Road (n=24), 6) KLG (Year Round Catch and Release/Artificials Only (C&R)) (n=48). The highest CPUE occurred from the Califon dam to the Hoffmans Crossing Road bridge with 3.4 trout per hour. Most anglers claimed to catch "mostly stocked fish" (50.7%), 7% claim to catch mostly wild trout, 38.7% say they catch an even mix, while 3.5% were not sure.

Anglers experienced high levels of satisfaction fishing on the South Branch with responding Excellent = 39.9%, Good = 45.5%, Fair = 11.9%, and Poor = 2.8%. The highest level of satisfaction was from anglers fishing from Flanders-Drakestown Road to the Bartley WMA (Good + Excellent = 95.7%). Angler satisfaction with the current general trout fishing regulations was high at 85.4%. Of those not satisfied, 83.3% would like to see more conservative regulations. Angler satisfaction with the C&R regulations at the Ken Lockwood Gorge was high (76.6%), with 4.3 % unsatisfied because they would like to see even more conservative regulations (i.e. fly only, hook restrictions, etc.). Only 33.6% satisfaction was noted on the Claremont Stretch (YTCA), with 5.8% dissatisfaction, and 33.6% "Don't Care" and 22.6% "Undecided." When asked what the South Branch should be managed primarily for, 67.6% responded "both stocked and wild trout," with 12.0% preferring to manage for stocked trout, and 11.3% preferring to manage for wild trout. When asked about the current fall stocking program (fewer but larger trout than in the past) and creel limit of 4 trout per day, 73.6% claim there are a sufficient number of trout and 15% say it is insufficient. Conversely, when asked if the fall creel limit should be reduced from 4 to 2, 65.0% are in favor, while 23.6% oppose. As anticipated, anglers fishing in special regulation areas (74.5%) at the time of survey were more likely to support reducing the fall creel limit as compared to anglers fishing general regulation areas (57.9%) at the time of survey.

Roosevelt Park Pond Angler Survey - An Opening Day Angler Count was conducted at Roosevelt Park Pond in order to assess a continued decline in angler turnout, corresponding with poor catch rates in recent years. Fifty-three anglers were counted and only one broodstock Rainbow Trout was caught between the hours of 8am to 12pm. In lieu of the poor fishing, 24 anglers would prefer the NJDFW continues to stock trout at Roosevelt Park Pond, while 11 were in support of the NJDFW discontinuing the stocking program and switching it to another nearby waterbody. A second angler survey was conducted on April 16, as a continued effort to understand trout angler participation and success. Poor catch rates may be a result of either cormorant predation of stocked trout during the preseason closure and/or cold water temperature. Fourteen anglers were interviewed an hour after trout were stocked on April 16. Angler success was significantly better than on opening day, in which the eight anglers that were fishing for at least a half hour caught a combined 15 trout. During this survey, only 3 cormorants were counted, trout were freshly stocked, and water temperatures increased. Thirteen of fourteen anglers interviewed prefer the NJDFW continues the trout stocking program at Roosevelt Park Pond.

Warmwater Angler Survey - In August 2015 the Bureau of Freshwater Fisheries launched an online angler survey geared towards warmwater and coolwater management programs. The survey covers general angling information, such as days fished and gear type used, as well as angling success at waterbodies stocked with species such as Muskellunge, Walleyes, Northern Pike, Hybrid Striped Bass, and Channel Catfish, as well as a section for Largemouth and Smallmouth Bass angling experiences. Opinions on regulations, management, and comparison to similar fishing opportunities in other states are also included for all species. Unlike previous online surveys, this survey is designed with a different question dataset depending on an angler's skill level varying from the beginner to the avid angler. To date, 549 anglers have taken the survey. The survey will continue until March 30, 2016.

Trout Angler Logbook Program

NJDFW utilizes a logbook (diary) program to obtain current information regarding trout angler catch and effort on special regulation areas on trout streams. Initially launched as a pilot program in 2012 on three special regulation trout fishing areas, the program was expanded in 2013 to include all seven areas. Logbooks are distributed annually to experienced anglers who indicate they regularly fish one or more of the areas in the study. Anglers record information about fish harvested or released during each trip, as well as time spent fishing and gear used. At the end of the calendar year anglers return their logbooks to NJDFW and the data is then compiled and analyzed during the following calendar year. Compared to other survey methods, angler logbooks are one of the least expensive ways to collect information on a fishery. Data collected through angler logbooks supplement other data collected by NJDFW (such as Opening Day angler surveys, telephone and internet-based surveys, on-site angler creel surveys, fish population surveys using electrofishing gear, and water temperature monitoring). Collectively, this data aids in evaluating the fishery and guides managers and stakeholders in making informed decisions that benefit both the resource users and the resource. (Federal Grant F-48-R, Project III)

In 2014 several noteworthy events occurred related to trout stocking and fishing in New Jersey. A new special regulation, *Catch & Release Area (CRA*) went into effect, replacing the existing *Fly Fishing Area* regulation on the Big Flat Brook/Flat Brook and the *Year Round Trout Conservation Area (YTCA)* regulation on the Ken Lockwood Gorge. Also, a disease outbreak (Furunculosis) in the Pequest Trout Hatchery resulted in reduced numbers of trout available for stocking the spring and fall of 2014. As a precaution, trout were not stocked in many of the trout-stocked waters that have or were connected to wild trout populations, including the Pequannock River *Seasonal Trout Conservation Area (STCA)* and the Ken Lockwood Gorge *CRA*. And the remaining streams in central and north Jersey were generally stocked with fewer trout than normal during the spring over a shorter period of time. These changes may have affected the fishing habits of trout anglers.

In 2014 seven special regulation areas were included in the logbook program and the logbooks results were compiled (see table below). A total of 58 anglers participated and 71 logbooks were distributed (some anglers needed more than one logbook to record all their trips). Despite efforts to encourage logbook returns only 15 anglers (26%) returned their logbooks. Collectively the 15 logbook anglers logged 325 trips to 6 of the 7 special regulation trout fishing areas. The S/Br. Raritan River – Ken Lockwood Gorge *CRA* was by far the most common destination, with 134 logged trips (41%), followed by the Pequest River *STCA* (69 trips, 21%), and the Musconetcong River *YTCA* (69 trips, 21%). The remaining 53 trips (16% of total) were to the Big Flat Brook/Flat Brook *CRA* (47 trips, 14%), S/Br. Raritan River – Claremont Stretch *YTCA* (5 trips, 2%), and Pequannock River *STCA* (1 trip, <1%). No fishing trips were recorded for the Toms River *YTCA*. Anglers fished an average of 2.1 to 4.5 hours per trip; the highest average trip lengths were on the Gorge (4.5 hrs/trip), the Musconetcong River (4.3 hrs/trip), and Pequest (3.6 hrs/trip). The logbook data includes trips that were taken to the *STCA*'s at times when the special regulations were not in effect. Interestingly, fly fishing gear was used by anglers for the majority of trips; only 11 trips (3%) used spin fishing gear (this data is not shown in the table).

Logbook anglers recorded a total catch of 1,695 trout. Catch and release fishing was practiced all the time, or nearly so; anglers recorded 1,659 trout released (97%), 1 trout kept (from the Pequest River *STCA*), and failed to indicate if 35 other trout were kept or released. The catch rate averaged 1.3 trout/hr, and ranged (by special regulation area) from 0.6 – 1.9 trout/hour. The average number of trout caught per trip was 5.2, and by special regulation area ranged from 2.0 – 6.9 trout/trip. The highest catch rates (per hour and per trip) occurred in the Pequest River *STCA*. The lowest catch rate was on the Pequannock River *STCA* (0.6 trout/hr and 2 trout/trip), which was most likely due to both the absence of stocking in 2014 and only a single trip was recorded. The average size of trout caught (results not provided in the table) was 297 mm (11.7 in) and they ranged in size from 76 mm (3 in) (in the Ken Lockwood Gorge *CRA* and Claremont *YTCA*) to 660 mm (26 in) (in the Pequest River *STCA*).

Of the total trout caught, anglers recorded the species for 99.5% (1,687 trout). Overall Rainbow Trout were caught most frequently (68.5%), followed by Brown Trout (30%), and Brook Trout (1%). Only 8 trout (0.5%) did not have species recorded. Rainbow Trout were more frequently caught in 3 of 6 special regulations areas: Musconetcong *YTCA* (98%), Pequest *STCA* (97%), and the Flat Brook/Big Flat Brook *C&RA* (88%). In the Ken Lockwood Gorge *C&RA*, Rainbow Trout made up 34.5% of the total catch. No Rainbow trout were recorded in the Claremont *YTCA* and Pequannock *STCA*. Brown Trout were caught more frequently than other species in

the Ken Lockwood Gorge (65%), Pequannock *STCA* (100%), and Claremont *YTCA* (100%). None of these streams were stocked by the Pequest Trout Hatchery in the spring, and all three have populations of wild Brown Trout.

Anglers were also asked to note if the origin of each trout they caught was wild, stocked, or unknown. This assessment can be very subjective and difficult since a decision is based primarily upon fin wear and also influenced by fish coloration. Anglers reported catching 10% wild trout and 84% stocked trout. Only 6% of trout were recorded as species origin unknown, indicating high angler confidence in their ability to make the distinction. For example, anglers fishing in the Pequest *STCA*, where trout are stocked (and naturally reproduced trout are absent, or nearly so, only 3 of the trout were considered wild, 4 were origin unknown, and 469 were considered stocked. In both the Pequannock and Claremont TCA's, which were not stocked with trout in 2014, anglers reported catching only wild trout. However, logbook anglers fishing the Ken Lockwood Gorge recorded 70% of the trout as being hatchery origin, even though no trout from the Pequest Trout Hatchery were stocked in 2014. Two likely reasons for the prevalence of stocked trout caught by anglers were the stocking of trout by private groups in 2014 (to offset NJDFW's decision to not stock trout there in 2014) and the ability of trout stocked in previous years to holdover.

Summary of fishing trip and catch statistics for 15 anglers who participated in the 2014 Trout Angler Logbook Program which targeted 7 special regulation trout fishing areas.

Total number of trips	Hours Per Trip	Number of trout caught by species[1]				Total trout caught	Number of trout caught by origin			% wild caught	Number of trout caught per	
		BKT	BNT	RBT	UNK		Wild	Stocked	UNK[1]		Hour	Trip
S/Br. Raritan River – Ken Lockwood Gorge (Catch & Release Area)												
134	4.5	0	457	243	3	703	151	495	57	21%	1.2	5.2
Pequest River (Seasonal Trout Conservation Area)												
69	3.6	1	12	463	0	476	3	469	4	<1%	1.9	6.9
Big Flat Brook / Flat Brook (Catch & Release Area)												
47	3.5	12	2	177	5	200	11	176	13	6%	1.2	4.3
Musconetcong River – Point Mtn. (Year Round Trout Conservation Area)												
69	4.3	2	6	296	0	304	7	271	26	2%	1.0	4.4
S/Br. Raritan River – Claremont Stretch (Year Round Trout Conservation Area)												
5	2.1	3	7	0	0	10	10	0	0	100%	0.9	2.0
Pequannock River (Seasonal Trout Conservation Area)												
1	3.2	0	2	0	0	2	2	0	0	100%	0.6	2.0
Toms River (Year Round Trout Conservation Area)												
0	0	0	0	0	0	0	0	0	0	0	0.0	0.0

[1] BKT = Brook Trout; BNT = Brown Trout; RBT = Rainbow Trout; UNK = unknown (trout species or origin).

In 2015 logbooks were prepared and distributed to 85 anglers who indicated they regularly fish the seven stream sections described above. The data from these logbooks (that are returned by anglers) will be compiled and the results summarized in the 2016 Field report.

INFORMATION AND EDUCATION

In addition to a multitude of research and management activities, the Bureau of Freshwater Fisheries actively participates in a number of Information and Education activities each year. Several such as two annual Fisheries Forums, a Public Trout Meeting, and biennial Public Hearing are directly tied to research and management activities and promulgation of regulations governing the state's freshwater aquatic resources. In addition, Bureau staff actively participates in the preparation of the Freshwater Fishing Digest. The Freshwater issue of the Digest is perhaps the most widely distributed publication throughout the Department.

Professional Meetings/Conferences

New Jersey participates in a number of regional initiatives geared towards the protection of the nation's freshwater fisheries resources. As such, state fisheries biologists participate in a number of regional panels and workshops to share information and experiences with biologists in other states on a variety of topics in the realm of fisheries management.

Eastern Brook Trout Joint Venture (EBTJV) Meeting - Attended an EBTJV meeting held in Hadley, Massachusetts. At the meeting, EBTJV's mapping of Brook Trout occurrence at the catchment scale (using data supplied by state fisheries agencies) was incorporated into a new patch designation. The approach allows states to view Brook Trout catchment data as collected patches, not only to identify key strongholds, but also to help prioritize catchments for restoration to connect patches to create larger strongholds. Since its inception in 2005, the EBTJV has coordinated range wide Brook Trout conservation and habitat restoration efforts through a collaborative, multi-agency approach. EBTJV partners (17 states, federal agencies, and NGO's) periodically meet to work, both collectively and in workgroups, on strategies and on-the-ground actions to improve water quality and restore Brook Trout habitat and populations. (Federal Grant F-48-R, Project I & II)

Public Presentations

Each year state fisheries biologists attend meetings of a variety of organizations which may include angling clubs, watershed groups, local planning boards, and sportsmen shows. (Hunter & Angler Fund)

In 2015, presentations on the fisheries resources within the state were presented to:

2015 North Jersey Fisheries Forum – Fifty anglers participated in the annual North Jersey Fisheries Forum held at the Hackettstown State Fish Hatchery on January 31, 2015. Presentations included Highlights of the 2014 Field Sampling efforts, with particular focus on the Coolwater Assessment Project, and highlights of the Lake Hopatcong Fisheries Inventory, a two-year project, which was recently completed. The Fisheries Forums, two held each year, provide anglers and state fisheries biologists the opportunity to discuss concerns and ideas pertaining to the management of the state's freshwater fisheries resources.

2015 South Jersey Fisheries Forum – Thirty anglers attended the South Jersey Fisheries Forum held at the Batsto Visitor's Center on February 21st, 2015. Results of 2014 Field Surveys were discussed, including highlights of the recently completed Fisheries Management Plan for Lake Hopatcong. The Fisheries Forums, two held each year, provide anglers and state fisheries biologists the opportunity to discuss concerns and ideas pertaining to the management of the state's freshwater fisheries resources.

2015 Trout Meeting – Regional fisheries biologists attended the 2015 Trout Meeting held at Pequest Trout Hatchery on February 28, 2015. Seventy-nine anglers were in attendance. Updates on NJDFW's 2015 Spring Trout Stocking Program were presented. Staff responded to concerns and inquiries from anglers across a variety of topic areas.

Joint Fish and Game Council Meeting – Fisheries Chief Lisa Barno presented a PowerPoint presentation to the joint Fish and Game Council and Endangered and Nongame Species Committee on the Paulins Kill Stream Restoration Project. The watershed wide project involves two dam removals, riparian and in-stream restoration, and bank stabilization through extensive tree planting. The presentation involved a project overview, summary of baseline data collection efforts, and current status. The Bureau is an active participant of the Columbia Lake Task Force.

NJ State Federation of Sportsmen's Clubs – Biologist Pat Hamilton prepared and presented a PowerPoint presentation on the Bureau's recent and planned freshwater fisheries field sampling activities at the Club's annual meeting on June 13, 2015.

Outdoor Writer's Workshop – Fisheries Chief Lisa Barno prepared and presented a PowerPoint presentation on NJDFW's upcoming Wildlife Management Area Survey, the Bureau's Online Warmwater Angler Survey, and highlights from the Bureau's 2014 Field Sampling Season, including a fisheries inventory completed at Lake Hopatcong.

Owassa Lake Fish Committee –Biologist Ross Shramko prepared and presented a power-point presentation to the Owassa Lake Fish Committee to assist the committee in proper lake management. Current status of the lake was discussed and data previously collected was analyzed and presented. Several management strategies were also discussed with a focus on collecting additional data for future analysis. The additional data will lead to better management decisions for the lake and will also give the Owassa Lake Fish Committee better clarity and focus on what steps should be taken to create the type of fishery that the lake association prefers.

Round Valley Trout Association – Biologist Shawn Crouse prepared and presented a PowerPoint presentation at Round Valley Trout Association's meeting held on March 19, 2015. Information provided included important dates, upcoming NJDFW events, current research and management of Round Valley Reservoir, with a focus on Lake Trout research and management.

Trout Unlimited – Biologist Pat Hamilton attended four Trout Unlimited Chapter meetings during the spring to promote the Angler Logbook Program and distribute logbooks.

Trout Unlimited East Jersey Chapter – Biologist Pat Hamilton prepared and presented a PowerPoint presentation at the Chapter's monthly meeting held on November 11, 2015. Information provided included wild Brook Trout genetics and current research and management of wild trout in New Jersey.

Public Events

The **New Jersey WILD Outdoor Expo** is an annual event celebrating the state's bountiful natural resources and rich outdoor heritage. The event was held on September 12 and 13, 2015, from 10 a.m. to 5 p.m. daily at the Colliers Mills Wildlife Management Area in Jackson Township, Ocean County. The Expo is an annual event which is free of charge and takes place rain or shine. The WILD Outdoor Expo is hosted by the NJDEP Division of Fish and Wildlife, Division of Parks and Forestry, the Green Acres Program and the Conserve Wildlife Foundation of New Jersey. The event also has several sponsors, and exhibitors and vendors from the field of outdoor recreation were on site. The Expo helps people connect with the natural world by providing a unique blend of conservation information, education and hands-on opportunities to learn outdoor skills and activities. Numerous environmental and conservation exhibits, demonstrations and seminars are planned for the weekend. Visitors can learn about, and try, a wide array of activities including fishing, hiking, shooting sports, kayaking, camping skills, rock climbing, wildlife watching and much more. (Hunter & Angler Fund)

Every year NJDFW holds an annual **Open House at the Pequest Trout Hatchery and Natural Resource Education Center**, prior to the opening of trout season. Each year thousands of people of all ages come to the hatchery to see the trout that are raised, and participate in many activities including kids fishing, shooting sports, fisherman's flea market, and much more. Staff assist in a number of facets including assisting at the Fishing Education Pond, providing demonstrations on the stripping an fertilization of eggs, providing fish for the kiddie pool, and answering questions from the general public. (Hunter & Angler Fund)

Attended the **Pequest Teen Angler Event (12th Annual)** held on July 18, 2015. Sixty-five anglers, 12 – 19 years old (16 of them being current license holders) participated in the event. Thirty-two adults (22 of them being current license holders) accompanied them. Fishing was red hot to start the day, after a fast moving thunder storm, and the action kept up right to the end. A total of 637 Rainbow Trout were caught, with 495 of them released and 142 kept. Food and prizes were donated for the event. The 13th Annual Pequest Teen Angler Event is scheduled for July 23, 2016. (Hunter & Angler Fund)

Union County's BioBlitz- The 2015 BioBlitz was held at Watchung Reservation on June 13th. The fish team, lead by New Jersey Department of Environmental Protection, Division of Fish and Wildlife, sampled the Green Brook, Blue Brook, Lake Surprise, Seeley's Pond, and a M pond. Unfortunately, Lake Surprise was in a lowered state due to a dam renovation, expected to last throughout the summer. The team used a variety of sampling methods including electro-shocking (using mild electrical currents to temporarily stun the fish for easy capture and identification) and seining. Seventeen fish species were collected. Native species included Pumpkinseed, Chain Pickerel, Common Carp, White Sucker, Blacknose Dace, Longnose Dace, Creek Chub, Golden Shiner, Brown Bullhead, Tessellated Darter, and American Eel. Non-native species include Largemouth Bass, Bluegill, Black Crappie, Western Mosquitofish, Rainbow Trout, and Brown Trout. The two Rainbow Trout (presumably stocked this spring) and two Brown Trout (presumably stocked during the spring of 2014) were encountered in the Green Brook. The warmwater fish assemblage encountered provides recreational opportunities for anglers, consisting primarily for sunfish. The fish team also conducted one waterfront public presentation, consisting of a fish collection demonstration by means of the use of a backpack electrofishing unit. The presentation also touched upon the job of a fisheries biologist, a summary of fishes encountered, and field identification. (Hunter & Angler Fund)

Chrissy Szpond, Seasonal Fisheries Technician with DFW, holding Chain Pickerel (left) and Steve Jandoli, Green Acres Supervising Program Development Specialist with DEP's Green Acres Program holding Largemouth Bass (right) collected in the Blue Brook, upstream of Seeleys Pond, Watchung Reservation, Union County.

Common Name	Seeley's Pond	Lake Surprise	Moxon Pond	Blue Brook (Deserted Village)	Blue Brook below Seeley's Pond)	Blue Brook (Rt. 642 Bridge)	Green Brook
American Eel	x			x	x		
Common Carp	x						
Golden Shiner		x		x			
Creek Chub				x			
Blacknose Dace				x	x		
Longnose Dace					x		
White Sucker				x			
Western Mosquitofish	x						
Tessellated Darter				x	x	x	
Largemouth Bass	x		x			x	
Black Crappie		x				x	
Pumpkinseed	x	x	x	x			
Bluegill	x	x	x				
Chain Pickerel		x		x		x	
Brown Bullhead	x	x		x			
Rainbow Trout							x
Brown Trout							x

OTHER FISHERIES RELATED ACTIVITIES

Permits

The Bureau of Freshwater Fisheries reviewed and issued 430 permits in 2015 to provide for the effective management and protection of the state's aquatic resources (see table below). These permits encompass 9 specific permits which include commercial harvest of aquatic species, water level management (for the protection of aquatic species), the introduction of aquatic species into waters of the state, as well as the collecting of aquatic species for scientific purposes, and special use permits. The review and approval of these permits not only include protection for freshwater fish, but also protection for other aquatic species such as frogs and turtles during critical spawning and hibernating periods. In addition to permits directly issued by the Bureau, the BFF also reviews Aquatic Use Permit Applications issued by the Department's Pesticide Control Program for the use of copper in waters known to be stocked or inhabited with trout. Trout are particularly sensitive to copper which is a basic agent for algal control treatments (copper sulfate) throughout the state. (Hunter & Angler Fund)

Permits issued by the Bureau of Freshwater Fisheries in 2015.

Permit Type	Number Issued
Baitfish - Commercial	7
Fish Stocking	140
Trout in the Classroom Fish Stocking	37 new
Gill Net – Staked - Commercial	0
Gill Net – Drifting - Commercial	0
Haul Seine - Commercial	1
Miniature Fyke/pot	5
Scientific Collecting	54
Special Use Limited License	39
Water Lowering	147
Total	**430**

Wildlife Management Area Fishing Tournament Permits

The popularity of recreational and tournament bass fishing was elevated to a new level during the 1960's. In an effort to unite bass anglers nationwide Ray Scott created the Bass Anglers Sportsmen Society (B.A.S.S). The goal of BASS was to emphasize conservation, education, and sportsmanship. Since 1996 the Division of Fish and Wildlife has required a permit to hold fishing tournaments on Wildlife Management Area Lakes. Permits are necessary to regulate the number of tournaments held on WMA Lakes, due to an increasing demand on our public waterbodies. NJDFW collects valuable information from tournament reports to supplement existing fisheries data. (Hunter & Angler Fund)

In 2015 there were 215 WMA Tournament Permits issued by the NJDFW. Anglers are required to submit a summary report within two weeks following the event. The return rate has been rather poor in the last couple years. In 2015, the South Jersey Bass Club Association diligently pursued members of the organization reminding them of the reporting requirement. Their campaign was successful resulting in a 137 reports received and a 64% return rate. In 2014 only 24% of reports were received. The four most popular waters in 2015 were Union Lake (40 tournaments), Salem Canal (36 tournaments), Lake Assunpink (34 tournaments) and Stone Tavern Lake (20 tournaments). The largest bass reported to date was a 5.86 pound Largemouth from Lake Assunpink. Assunpink Lake has shown a significant decrease in the number of fish, greater than five pounds weighed during tournaments. This may be attributed to both Largemouth Bass Virus, other bacteria related fish kills, as well as illegal harvest from ice fisherman.

The tournament report forms are a vital component of the tournament permit process. A summary of tournament results will be prepared and available later in 2016.

Database Management - FishTrack

FishTrack is an Access database which houses New Jersey's Bureau of Freshwater Fisheries stocking information and field survey data collected by NJDFW throughout the state, historically through present day. In 2015 the FishTrack database went through several small formatting cleanups and one major upgrade. A new template has been created in the FishTrack database to create the Stream Survey Data Tables found in the appendix of this report. This upgrade to the database saves NJDFW staff several weeks of creating tables by hand and validating the material for accuracy. All 2015 field survey data has been inputted and validated for accuracy. Maintaining an accurate and consistent database is critical as this gives staff biologists the ability to access accurate historical data to assist with appropriate management of the state's fisheries resources. (Federal Grant F-48-R, Project I)

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