APPENDIX A

Stream Electrofishing Survey Data (2015)

This section of the report includes stream survey data completed by the Bureau of Freshwater Fisheries in 2015. All surveys, unless specifically noted otherwise, are sampled in accordance to the Bureau's established stream sampling protocol which is consistent with EPA's Rapid Bioassement Protocol for Wadeable Streams. The Bureau's wadeable stream survey protocol can be found in Appendix C. The Bureau also assesses in-stream and riparian conditions by performing a Habitat Assessment at the time of each survey. This assessment is consistent with the EPA Rapid Bioassessment sampling habitat assessment protocol with regional modifications (Appendix D). Basic water quality parameters are also measured.

Surveys are listed alphabetically by stream name within identified watershed areas. Each survey is identified by the specific Activity by which it was funded. It is important to note, however, the use of established stream sampling protocols permits data to be used beyond the specific Activity for which they were collected. Data provided for the purposes of this report is only a summary of the individual stream survey data collected by the DFW's Bureau of Freshwater Fisheries. All stream data collected under the Bureau's standardized sampling protocol is entered into the Division's FishTrack database.

Surveys in the Southern Region
(Lower Delaware River and Lower Atlantic Coastal)

Masons Run

Date: 08/18/2015
County: Camden
Township: Pine Hill Boro
Drainage: Big Timber Creek
Project: General Fisheries Survey
Location: **150 m upstream of the Mansions Apartment Complex**

Fish Species	Number	Length (mm)
Eel, American	8	0 - 0
Mudminnow, Eastern	2	0 - 0
Sunfish, Mud	2	132 - 138
Trout, Brook	2	230 - 275

Water Chemistry / Habitat

Water Temperature (C):	18.5
Dissolved Oxygen (mg/L):	7.43
Specific Conductance (uS/cm):	165.1
pH:	6.86
Alkalinity (mg/L):	N/A
Sample Length (m):	150
Habitat Assessment Score:	N/A

Summary: An electrofishing survey was conducted on Mason's Run upstream of the access road in close proximity to the Mansion Apartment's parking lot. Previous surveys indicate the stream supports a wild Brook Trout population. The location was last sampled in 2011. A total of two adult wild Brook Trout, 230 mm and 275 mm (9.1 – 10.8 in) were collected. No young-of-the-year (YOY) trout were encountered. This portion of Masons Run has been sampled six times since 2000 and historically had the most favorable habitat. Increased sedimentation and flooding rain events have altered this section resulting in less favorable habitat and an impacted trout population.

Recommendation: No additional surveys are necessary at this time.

Masons Run

Date: 08/18/2015
County: Camden
Township: Pine Hill Boro
Drainage: Big Timber Creek
Project: General Fisheries Survey
Location: **150 m downstream of culvert on Branc Rd, Trump National Philadelphia golf course**

Fish Species	Number	Length (mm)
Darter, Tessellated	5	58 - 93
Eel, American	1	0 - 0
Mudminnow, Eastern	7	0 - 72
Pickerel, Chain	2	220 - 221
Trout, Brook (YOY)	2	65 - 72
Trout, Brook	3	148 - 262

Water Chemistry / Habitat

Water Temperature (C): 18.5
Dissolved Oxygen (mg/L): 7.43
Specific Conductance (uS/cm): 165.1
pH: 6.86
Alkalinity (mg/L): N/A
Sample Length (m): 150
Habitat Assessment Score: N/A

Summary: An electrofishing survey was conducted on Mason's Run downstream of the main access road entering Trump National Golf Course. Previous surveys indicate the stream supports a wild Brook Trout population. The location was last sampled in 2011. A total of three adult wild Brook Trout, 148 mm to 262 mm (5.8 – 10.3 in) were collected. Two young-of-the-year (YOY) trout were encountered. This portion of Masons Run has been sampled multiple times since 2000. This section of the stream was previously altered during the construction of the golf course and small on-stream impoundment was eliminated improving trout supporting habitat in this section.

Recommendation: No additional surveys are necessary at this time.

Surveys in the Upper Delaware Region (Upper Delaware & Wallkill)

Bear Creek

Date: 08/13/2015
County: Warren
Township: Allamuchy Twp.
Drainage: Pequest River
Project: Wild Trout Stream Assessment
Location: **Shades of Death Rd. bridge**

Water Chemistry / Habitat

Water Temperature (C):	18.9
Dissolved Oxygen (mg/L):	11.55
Specific Conductance (uS/cm):	452.1
pH:	8.28
Alkalinity (mg/L):	199
Sample Length (m):	150
Habitat Assessment Score:	159 Sub-Optimal (low gradient)

Fish Species	Number	Length (mm)
Bass, Largemouth	3	54 - 83
Bullhead, Brown	1	189 - 189
Dace, Blacknose	18	0 - 0
Dace, Longnose	4	0 - 0
Darter, Tessellated	59	0 - 0
Eel, American	43	0 - 0
Hybrid, Sunfish	2	77 - 110
Lamprey, Sea	3	0 - 0
Mudminnow, Eastern	2	0 - 0
Pickerel, Redfin	11	103 - 216
Sucker, White	33	0 - 0
Sunfish, Bluegill	11	73 - 96
Sunfish, Pumpkinseed	2	74 - 84
Trout, Brook	25	146 - 231
Trout, Rainbow	2	274 - 303

Summary: This low gradient stream flows through swamp land in a broad, rolling valley before entering the Pequest River upstream of Great Meadows. The stream's mucky bottom substrate and high alkalinity is a natural condition, not the result of human activity, but rather a reflection of its geology (underlain with carbonate rock) and glacial origin. These two stream characteristics are unusual compared to most wild trout streams in New Jersey, which are typically higher gradient, freestone streams having rocky substrate and low alkalinities (<50 mg/L). Although regulated as a *Wild Trout Stream*, this stream is classified as *Trout Maintenance* because trout reproduction (i.e., presence of young-of-the-year (YOY) trout) has never been documented despite the presence of wild Brook Trout age 1 and older. Two surveys conducted on this stream in 2014 yielded only one wild Brook Trout measuring 210 mm (8.3 inches). The low trout abundance was cause for concern, prompting a follow-up survey in 2015.

Another site, further downstream (and just above I-80), was selected for survey in 2015 in hopes that wild Brook Trout would be more abundant with increased flow. At this site heavy deposits of silt/sand/clay and mats of elodea (submerged rooted aquatic vegetation) were present along with grassy undercut banks and deep pools which collectively provided excellent cover for fish. One of the pools was too wide and deep to electrofish properly, and unfortunately some fish eluded capture. A total of 25 Brook Trout were captured and all were considered to be wild in origin. The largest was 231 mm (9.1 in) and none were YOY. Two Rainbow Trout of hatchery origin (as indicated by their length and fin erosion) were also captured and these trout were likely stocked in the Pequest River during the past spring. Other species captured included Redfin Pickerel and Eastern Mudminnow, two native species often found in low gradient, swamp-like north Jersey streams like Bear Creek, and 10 other fish species, including Green Sunfish, an invasive fish species.

Recommendation: This creek should be more thoroughly inspected (perhaps with the assistance of Trout Unlimited) to identify potential trout spawning areas for future fish sampling. This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Beatty's Brook

Date: 07/31/2015
County: Hunterdon
Township: Lebanon Twp.
Drainage: Musconetcong River
Project: Wild Trout Stream Assessment
Location: **Off Penwell Road, opposite Hermits Lane**

Fish Species	Number	Length (mm)
Dace, Blacknose	33	0 - 0
Eel, American	17	0 - 0
Trout, Brook (YOY)	16	60 - 77
Trout, Brook	38	113 - 217
Trout, Brown	3	149 - 196

Water Chemistry / Habitat

Water Temperature (C): 18.9
Dissolved Oxygen (mg/L): 8.85
Specific Conductance (uS/cm): 154.1
pH: 7.64
Alkalinity (mg/L): 28.5
Sample Length (m): 150
Habitat Assessment Score: 182 Optimal

Summary: This small *Trout Production* stream enters the Musconetcong River just upstream from the Penwell dam, above the Point Mountain Year Round Trout Conservation Area. The in-stream habitat was excellent for trout, though the steep gradient, swift current and large boulders made wading and netting fish difficult. Four fish species were documented in the 2015 survey. A total of 54 Brook Trout and 3 Brown Trout were captured and these were all wild fish. Similar numbers of wild trout have been documented in electrofishing surveys conducted in the past on this stream. In 1970 Brook Trout was the only trout species present (58 individuals captured, over a distance of 183 m). When surveyed 31 years later (2001) it was discovered that wild Brown Trout had colonized the stream, though they were less numerous (26 individuals) than Brook Trout (40 individuals). The presence of Brown Trout, a non-native trout species that competes with Brook Trout for food, cover, and spawning substrate, is cause for concern since Brook Trout, New Jersey's only native trout species, now survive in less than half its original range statewide. A section of this stream flows through property owned by Hunterdon County and is publicly accessible. This stream currently does not have special trout fishing regulations (statewide general trout regulations apply), but it may be a good candidate for a wild trout stream regulation.

Recommendation: This 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. This stream should be periodically monitored at a minimum in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Beerskill Creek

Date: 07/28/2015
County: Sussex
Township: Sandyston Twp.
Drainage: Flat Brook
Project: Temperature Study - TP Streams
Location: **Cemetery Rd**

Water Chemistry / Habitat

Water Temperature (C):	20.5
Dissolved Oxygen (mg/L):	9.76
Specific Conductance (uS/cm):	91.8
pH:	7.13
Alkalinity (mg/L):	23
Sample Length (m):	150
Habitat Assessment Score:	169 Optimal

Fish Species	Number	Length (mm)
Chubsucker, Creek	1	0 - 0
Dace, Blacknose	98	0 - 0
Darter, Tessellated	18	0 - 0
Eel, American	17	0 - 0
Lamprey, Sea	2	0 - 0
Pickerel, Redfin	2	95 - 212
Sculpin, Slimy	60	0 - 0
Sucker, White	1	0 - 0
Sunfish, Bluegill	1	44 - 44
Sunfish, Pumpkinseed	1	109 - 109
Trout, Brook (YOY)	8	55 - 81
Trout, Brook	21	136 - 292

Summary: Beerskill Creek is a small stream that flows out of both Highpoint State Park & Stokes State Park and ultimately into the Little Flat Brook. In 2015, this stream was surveyed to assess the fish population at a survey location where a continuous stream temperature monitoring gage is located. The paring of fish population data to the continuous temperature monitoring data will help determine the overall health of the stream and the health of the native Brook Trout population found here. 29 wild Brook Trout (8 young-of-the-year) were found indicating that this stream is in fairly good health. Previous surveys were done in 1968, 2004, and 2013 at an upstream location from this survey site. These surveys also found similar Brook Trout numbers of 20 in 1968, 18 in 2004, and 7 in 2013. Stream temperature in the 2015 survey was 20.5 degrees Celsius. This temperature is above the optimal temperature for Brook Trout and the stress from this warmer than optimal temperature is a concern. The data from the continuous temperature monitor at this location will tell us how often and how long temperatures are a stressor for Brook Trout. Several warmwater species (Redfin Pickerel, Bluegill Sunfish, and Pumpkinseed Sunfish) were found in the 2015 survey that were never documented in previous surveys. The competition for resources from these species on Brook Trout is also a concern for the Brook Trout population. It is unknown if these warmwater species have recently moved into Beerskill Creek or if they have been at this location previously since this was the first ever survey at this downstream location. A native fish species of special interest to biologists based on its abundance statewide and habitat requirement (Slimy Sculpin) was also found at this location. A total of 229 individual fish representing 11 different species were found in this survey.

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 13 *Trout Production* streams. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide in better management of our *Trout Production* streams.

Big Flat Brook

Date: 07/14/2015
County: Sussex
Township: Sandyston Twp.
Drainage: Flat Brook
Project: Trout Special Regulation Area
Location: **Old Police Barracks between Rt. 206 and Rt. 560.**

Water Chemistry / Habitat

Water Temperature (C):	18.6
Dissolved Oxygen (mg/L):	9.05
Specific Conductance (uS/cm):	99.6
pH:	7.71
Alkalinity (mg/L):	11
Sample Length (m):	150
Habitat Assessment Score:	180 Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	2	62 - 71
Chub, Creek	3	0 - 0
Dace, Blacknose	48	0 - 0
Dace, Longnose	38	0 - 0
Darter, Tessellated	11	0 - 0
Eel, American	37	0 - 0
Minnow, Cutlip	6	0 - 0
Sculpin, Slimy	8	0 - 0
Shiner, Common	10	0 - 0
Sunfish, Bluegill	3	36 - 87
Trout, Brook	3	170 - 205
Trout, Rainbow	3	280 - 388

Summary: Prior to 2014, special trout fishing regulations (fly fishing for most or all of the year, and harvest allowed) had been in place for over 50 years on a 4.1 mile stretch of the Big Flat Brook/Flat Brook. In 2014, year round *Catch & Release - Artificials Only* fishing regulations were implemented. Electrofishing surveys have been conducted annually within this special regulation area since 2012 to assess the trout fishery. Described below are the results from the station located the furthest upstream of the survey stations.

Although the special regulation section is classified as *Trout Production* and is trout-stocked, relatively few trout have been encountered at the previously sampled survey locations. In 2015, one of the survey locations was moved upstream to this survey location in an effort to locate more trout. Unfortunately, more trout were not found at this new location. 3 Rainbow Trout (stocked this spring) and 3 Brook Trout (wild) were the only trout collected. Higher than average flows made sampling difficult and may have had a negative effect on total trout caught in the survey as several trout in a deeper pool were not captured. The total trout seen and collected was still lower than anticipated after the new *catch & release* regulations were instituted. A native fish species of special interest to biologists based on its abundance statewide and habitat requirement (Slimy Sculpin) was found at this location. Overall 172 individual fish were collected representing 12 different species.

Recommendation: The data from the electrofishing surveys, along with continuous water temperature and angler survey/catch data will be used to evaluate fishing regulation changes on the trout fishery.

Big Flat Brook

Date: 07/16/2015
County: Sussex
Township: Sandyston Twp.
Drainage: Flat Brook
Project: Trout Special Regulation Area
Location: **Rt. 560 downstream, off unnamed dirt road between Rt. 560 and Warner's Hole**

Water Chemistry / Habitat

Water Temperature (C):	17.1
Dissolved Oxygen (mg/L):	9.77
Specific Conductance (uS/cm):	94.9
pH:	7.87
Alkalinity (mg/L):	33
Sample Length (m):	150
Habitat Assessment Score:	156 Sub-Optimal

Fish Species	Number	Length (mm)
Dace, Blacknose	72	0 - 0
Dace, Longnose	23	0 - 0
Darter, Tessellated	14	0 - 0
Eel, American	72	0 - 0
Lamprey, Sea	1	0 - 0
Madtom, Margined	1	0 - 0
Minnow, Cutlip	8	0 - 0
Sculpin, Slimy	6	0 - 0
Shiner, Common	2	0 - 0
Sucker, Northern Hog	1	0 - 0
Trout, Rainbow	10	287 - 339

Summary: Prior to 2014, special trout fishing regulations (fly fishing for most or all of the year, and harvest allowed) had been in place for over 50 years on a 4.1 mile stretch of the Big Flat Brook/Flat Brook. In 2014, year round *Catch & Release - Artificials Only* fishing regulations were implemented. Electrofishing surveys have been conducted annually within this special regulation area since 2012 to assess the trout fishery. Described below are the results from the station located downstream of Rt. 560 and a popular fishing location known as "Warner's Hole."

Although the special regulation section is classified as *Trout Production* and is trout-stocked, relatively few trout have been encountered at the previously sampled survey locations. In 2015, one of the survey locations was moved upstream to this survey location. This new sampling location is located very close to several trout stocking points that were stocked this spring. It is thought that due to the proximity to trout stocking locations, this site may produce higher than average trout numbers. The survey collected 10 Rainbow Trout (stocked this spring). Ten trout is an average number, but not as high as predicted. A possible reason for this is that several trout could be seen from the bank downstream from the sampling location in a deep pool known as "Warner's Hole". Some of the fish that would have been in the sampling location may have moved into the deeper hole which is unable to be sampled by stream backpack electrofishing gear. Two native fish species of special interest to biologists based on their abundance statewide and habitat requirements (Slimy Sculpin & Northern Hog Sucker) were found at this location. A juvenile sea lamprey was also collected in the 2015 survey. The presence of sea lamprey in the Big Flat Brook has been documented in the past and is not thought to be a major concern at this time. Overall, 208 individual fish were collected representing 9 different species.

Recommendation: The data from the electrofishing surveys, along with continuous water temperature and angler survey/catch data will be used to evaluation fishing regulation changes on the trout fishery.

Big Flat Brook

Date: 07/14/2015
County: Sussex
Township: Sandyston Twp.
Drainage: Flat Brook
Project: Trout Special Regulation Area
Location: **Blewett Tract (Station #1) unnamed dirt road off Three Bridges Road access**

Water Chemistry / Habitat

Water Temperature (C):	19.3
Dissolved Oxygen (mg/L):	8.76
Specific Conductance (uS/cm):	98.9
pH:	7.61
Alkalinity (mg/L):	20
Sample Length (m):	150
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Chub, Creek	23	0 - 0
Dace, Blacknose	37	0 - 0
Dace, Longnose	7	0 - 0
Darter, Shield	2	0 - 0
Darter, Tessellated	29	0 - 0
Eel, American	11	0 - 0
Lamprey, American Brook	6	0 - 0
Madtom, Margined	5	0 - 0
Minnow, Cutlip	19	0 - 0
Pickerel, Redfin	4	56 - 158
Sculpin, Slimy	22	0 - 0
Shiner, Common	5	0 - 0
Sucker, Northern Hog	2	0 - 0
Sucker, White	13	0 - 0
Trout, Brook	1	182 - 182
Trout, Rainbow	2	280 - 300

Summary: Prior to 2014, special trout fishing regulations (fly fishing for most or all of the year, and harvest allowed) had been in place for over 50 years on a 4.1 mile stretch of the Big Flat Brook/Flat Brook. In 2014, year round *Catch & Release - Artificials Only* fishing regulations were implemented. Electrofishing surveys have been conducted annually within this special regulation area since 2012 to assess the trout fishery. Described below are the results from the station located from the area known as the Blewett Tract.

Although the special regulation section is classified as *Trout Production* and is trout-stocked, relatively few trout have been encountered at this survey location. In the 2015 survey, only 2 Rainbow Trout (hatchery origin) and 1 Brook Trout (wild fish) were found. The 2014 survey found only 2 Brown Trout (wild fish). No trout were present in 2013 and only 8 trout (7 wild Brook Trout and 1 stocked Rainbow Trout) were found in 2012. It is not immediately apparent why so few trout are present at this location. One hypothesis is that the trout are concentrated in nearby pools too deep to sample with standard electro-fishing equipment. As population size increases in these pools due to the new no harvest regulation, fish may distribute themselves throughout the stream and possibly into this sampling location. Three native fish species of special interest to biologists based on their abundance statewide and habitat requirements (Shield Darter, Slimy Sculpin & Northern Hog Sucker) were found at this location. Overall, 173 individual fish were collected representing 13 different species.

Recommendation: The data from the electrofishing surveys, along with continuous water temperature and angler survey/catch data will be used to evaluate fishing regulation changes on the trout fishery.

Bowers Brook

Date: 07/29/2015
County: Warren
Township: Independence Twp.
Drainage: Musconetcong River
Project: Wild Trout Stream Assessment
Location: **Route 517 bridge, upstream**

Fish Species	Number	Length (mm)
Trout, Brook (YOY)	37	42 - 79
Trout, Brook	5	137 - 157

Water Chemistry / Habitat

Water Temperature (C):	16
Dissolved Oxygen (mg/L):	9.73
Specific Conductance (uS/cm):	625
pH:	8.14
Alkalinity (mg/L):	266
Sample Length (m):	150
Habitat Assessment Score:	168 Optimal

Summary: This small stream enters the Musconetcong River downstream of the Mars, Inc. facility in Hackettstown. Its headwaters (upstream of Mars) were first sampled in 2001, and the only fish species present was Brook Trout. A total of 155 individuals were captured (71 young-of-the-year, 84 older) and the stream's surface water classification (source to Rt. 517) was subsequently upgraded to *Trout Production*. In the 2015 electrofishing survey considerably fewer Brook Trout (42 individuals) were captured and the largest measured only 157 mm (6.2 in) compared to 255 mm (10 in) in 2001. Within the stream section surveyed the stream passes through a perched culvert. This culvert impedes, and may block, upstream fish migration. In addition, numerous survey markers were observed in and around the stream, suggesting the surrounding undeveloped forest may be targeted for development.

Recommendation: Removal of the culvert (or replacement with a culvert or bridge that spans the stream channel) is recommended in order to restore stream connectivity and enhance fish/wildlife passage. This 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. This stream should be periodically monitored at a minimum in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Brass Castle Creek

Date: 07/30/2015
County: Warren
Township: Washington Twp.-Warren Co.
Drainage: Pohatcong Creek
Project: Wild Trout Stream Assessment
Location: **Harmony Brass Castle Road, upstream of 2-acre reservoir**

Fish Species	Number	Length (mm)
Dace, Blacknose	100	0 - 0
Sunfish, Pumpkinseed	2	81 - 82
Trout, Brook (YOY)	93	41 - 79
Trout, Brook	75	87 - 187

Water Chemistry / Habitat

Water Temperature (C): 19.1
Dissolved Oxygen (mg/L): 110.5
Specific Conductance (uS/cm): 170
pH: 7.56
Alkalinity (mg/L): 31
Sample Length (m): 150
Habitat Assessment Score: 176 Optimal

Summary: Two sites on this *Trout Production* stream (also known as Roaring Rock Brook) were surveyed in 2015 to assess the status of wild trout population. The uppermost stream survey (described here) was conducted on a reach located upstream of a small, two-acre on-stream reservoir, and within a municipally-owned park (Roaring Rock Park). This reach had never been surveyed before by NJDFW. The only trout species present was Brook Trout and they were relatively abundant (168 individuals and, of theses, 93 were young-of-the-year). The largest fish was 187 mm (7.4 in). The reservoir's dam effectively blocks upstream fish migration and prevents the wild Brown Trout population from colonizing these headwaters.

Recommendation: To conserve and protect the wild Brook Trout population it is recommended that the reservoir dam not be removed to restore connectivity because the dam is an effective barrier that prevents Brown Trout from impacting the wild Brook Trout population. This stream may be a good candidate for a special fishing regulation, particularly since sections of it flow through public land. This 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. This stream should be periodically monitored at a minimum in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Brass Castle Creek

Date: 08/12/2015
County: Warren
Township: Washington Twp.-Warren Co.
Drainage: Pohatcong Creek
Project: Wild Trout Stream Assessment
Location: **Kayharts Lane bridge, upstream**

Water Chemistry / Habitat

Water Temperature (C):	20.5
Dissolved Oxygen (mg/L):	8.74
Specific Conductance (uS/cm):	227.2
pH:	7.86
Alkalinity (mg/L):	31
Sample Length (m):	150
Habitat Assessment Score:	165 Optimal

Fish Species	Number	Length (mm)
Chub, Creek	53	0 - 0
Dace, Blacknose	237	0 - 0
Dace, Longnose	21	0 - 0
Darter, Tessellated	12	0 - 0
Eel, American	20	0 - 0
Lamprey, American Brook	1	0 - 0
Lamprey, Sea	5	0 - 0
Minnow, Cutlip	3	0 - 0
Shiner, Common	18	0 - 0
Sucker, White	24	0 - 0
Sunfish, Pumpkinseed	2	54 - 59
Trout, Brown (YOY)	24	51 - 88
Trout, Brown	22	133 - 226

Summary: Two sites on this *Trout Production* stream (also known as Roaring Rock Brook) were surveyed in 2015 to assess the status of wild trout population. The lowermost stream survey (described here) was conducted on a reach that flows through Meadow Breeze Park. A total of 48 wild Brown Trout were captured (24 of these were young-of-the-year) and the largest was 226 mm (8.9 in). A variety of other fish species (10) were also documented. This stream was dropped from the spring trout stocking program in 2010 because it provides anglers with an opportunity to fish for wild trout. Anglers may be unaware of this opportunity because the stream is not regulated as a *Wild Trout Stream* (statewide general trout regulations in effect). This stream may be a good candidate for a special fishing regulation, particularly since sections of it flow through public land.

Recommendation: This 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. This stream should be periodically monitored at a minimum in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Criss Brook

Date: 08/12/2015
County: Sussex
Township: Sandyston Twp.
Drainage: Flat Brook
Project: Wild Trout Stream Assessment
Location: **Flatbrook Road**

Fish Species	Number	Length (mm)
Dace, Blacknose	68	0 - 0
Dace, Longnose	3	0 - 0
Eel, American	15	0 - 0
Sculpin, Slimy	21	0 - 0
Trout, Brook (YOY)	17	59 - 108
Trout, Brook	25	117 - 194

Water Chemistry / Habitat

Water Temperature (C): 18.2
Dissolved Oxygen (mg/L): 9.02
Specific Conductance (uS/cm): 64.4
pH: 7.81
Alkalinity (mg/L): 26
Sample Length (m): 150
Habitat Assessment Score: 167 Optimal

Summary: Criss Brook is a small stream located in Sandyston Township, Sussex County that flows directly into the Big Flat Brook in Stokes State Forest. Criss Brook was sampled on August 12 and found 42 (17 young-of-the-year (YOY)) wild Brook Trout. Criss Brook was also sampled in 2006 at a survey point located just downstream from this survey location and found similar Brook Trout numbers. The 2006 survey found 47 Brook Trout (12 YOY). The results from the two surveys conducted 9 years a part indicate that the Brook Trout population is stable. Further analysis of the population size structure and location of public and private land will be used to determine if this stream will be added to the Division's *Wild Trout Program*. The overall health of this small stream is considered to be high as the fish species found in both surveys were similar of what is typically found in a healthy small coldwater tributary to a major river. Overall, 149 individual fish representing 5 different species were collected at this location.

Recommendation: This 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. This stream should be periodically monitored at a minimum in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Flat Brook

Date: 07/16/2015
County: Sussex
Township: Sandyston Twp.
Drainage: Flat Brook
Project: Trout Special Regulation Area
Location: **Three Bridges (Flat Brook WMA)**

Water Chemistry / Habitat

Water Temperature (C):	18.7
Dissolved Oxygen (mg/L):	10.81
Specific Conductance (uS/cm):	209.7
pH:	8.66
Alkalinity (mg/L):	66
Sample Length (m):	150
Habitat Assessment Score:	167 Optimal

Fish Species	Number	Length (mm)
Chub, Creek	9	0 - 0
Dace, Blacknose	39	0 - 0
Dace, Longnose	8	0 - 0
Darter, Shield	2	0 - 0
Darter, Tessellated	37	0 - 0
Eel, American	29	0 - 0
Minnow, Cutlip	17	0 - 0
Sculpin, Slimy	1	0 - 0
Shiner, Common	4	0 - 0
Shiner, Spottail	3	0 - 0
Sucker, White	3	0 - 0
Trout, Brook	1	206 - 206
Trout, Rainbow	47	260 - 378

Summary: Prior to 2014, special trout fishing regulations (fly fishing for most or all of the year, and harvest allowed) had been in place for over 50 years on a 4.1 mile stretch of the Big Flat Brook/Flat Brook. In 2014, year round *Catch & Release - Artificials Only* fishing regulations were implemented. Electrofishing surveys have been conducted annually within this special regulation area since 2012 to assess the trout fishery. Described below are the results from the station located the furthest downstream of the survey stations.

Although the special regulation section is classified as *Trout Production* and is trout-stocked, relatively few trout have been encountered at the previously sampled survey locations. In 2015, one of the survey locations was moved upstream to this new survey location. Of the 4 survey locations from this year, this location produced the most fish and shows that fishing is still excellent well past the spring stocking season. 47 Rainbow Trout all determined to have been stocked this spring and 1 wild Brook Trout were collected. This is the best evidence that the *Catch & Release* Regulation change is showing positive results and that the trout remain available to fisherman long after spring stocking has finished. This survey location occurred at a popular fishing area and is float stocked during the spring and fall trout programs. Two native fish species of special interest to biologists based on their abundance statewide and habitat requirements (Shield Darter & Slimy Sculpin) were found at this location. Overall, 200 individual fish were collected representing 13 different species.

Recommendation: The data from the electrofishing surveys, along with continuous water temperature and angler survey/catch data will be used to evaluate fishing regulation changes on the trout fishery.

Forked Brook

Date: 07/28/2015
County: Sussex
Township: Sandyston Twp.
Drainage: Flat Brook
Project: Temperature Study - TP Streams
Location: **Graw Rd, 95m upstream of confluence of Big Flat Brook**

Fish Species	Number	Length (mm)
Chub, Creek	1	0 - 0
Dace, Blacknose	89	0 - 0
Dace, Longnose	1	0 - 0
Eel, American	2	0 - 0
Minnow, Cutlip	1	0 - 0
Sculpin, Slimy	11	0 - 0
Trout, Brook (YOY)	3	53 - 69
Trout, Brook	10	108 - 180

Water Chemistry / Habitat

Water Temperature (C): 18.7
Dissolved Oxygen (mg/L): 8.38
Specific Conductance (uS/cm): 113.5
pH: 7.16
Alkalinity (mg/L): 18
Sample Length (m): 150
Habitat Assessment Score: 179 Optimal

Summary: Forked Brook is a small stream that flows into the Big Flat Brook in Stokes State Forest, Sandyston Township, Sussex County. In 2015 this stream was surveyed to assess the fish population at a survey location where a continuous stream temperature monitoring gage is located. The paring of fish population data to the continuous temperature monitoring data will help determine the overall health of the stream and the health of the native Brook Trout population found here. The 2015 survey found 13 (3 young-of-the-year (YOY)) wild Brook Trout. This stream was previously sampled in 2007 at a slightly upstream location and found 24 (6 YOY) wild Brook Trout. The relatively small number of Brook Trout found in 2007 & 2015 is a bit of a concern and should be monitored. Stream temperature in 2015 was 18.7 degrees Celsius which is ok for Brook Trout, but in the 2007 survey it was 20.2 degrees Celsius, which is near the upper range for Brook Trout and may be causing stress to the population. The data from the continuous temperature monitoring probe will tell us a lot more on the health of the stream and if temperature is a concern. These small streams are important feeder streams to the Big Flat Brook's wild trout populations and without them and their cold water influence the Big Flat Brook may not have any wild trout found in its waters. Overall, 118 individual fish were collected representing 7 different species.

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 13 *Trout Production* streams. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide in better management of our *Trout Production* streams.

Franklin Pond Creek

Date: 07/21/2015
County: Sussex
Township: Franklin Boro
Drainage: Wallkill River
Project: Trout Production Re-Inventory
Location: **Off route 23, near vacant old Forest Fire building. #20 Route 23**

Fish Species	Number	Length (mm)
Bullhead, Yellow	2	99 - 119
Chub, Creek	9	0 - 0
Dace, Blacknose	96	0 - 0
Dace, Longnose	61	0 - 0
Darter, Tessellated	1	0 - 0
Perch, Yellow	5	49 - 58
Sucker, White	3	0 - 0
Sunfish, Bluegill	6	61 - 89
Trout, Rainbow	4	288 - 306

Water Chemistry / Habitat

Water Temperature (C): 22.6
Dissolved Oxygen (mg/L): 8.36
Specific Conductance (uS/cm): 436.9
pH: 8.16
Alkalinity (mg/L): 68.5
Sample Length (m): 150
Habitat Assessment Score: 119 Sub-Optimal

Summary: Franklin Pond Creek is a *Trout Production* stream that is also part of the Division's Trout Stocking Program. This year, sampling efforts did not find any wild trout, but did find 4 stocked Rainbow Trout (the only species stocked in this stream) holding over this late in the summer. This shows that water conditions may be cool enough to hold trout over, but that conditions are not great for wild trout reproduction. Franklin Pond Creek has been sampled at this similar location in 1970 and in 1991 in which wild reproducing trout were found. One Brown Trout (young-of-the-year (YOY)) and one Rainbow Trout (Stocked) were found in 1970 and one Brook Trout (YOY) and three Brown Trout (two YOY) were found in 1991. Water temperature found during the 2015 survey was very warm (22.6 degrees Celsius) and probably a major factor as to why trout reproduction was not found or is occurring in low numbers in the stream. Stream temperatures have been warm in previous surveys (1970 – 20 degrees Celsius, 1991- 20.5 degrees Celsius) but not as warm as found in 2015. In addition to the stream temperature stress on Brook Trout, the specific conductance reading was high, indicating poor water quality, and the habitat was assessed at a low sub-optimal level. These indicators all point towards a degraded stressful situation for Brook Trout and are all contributors to the fact that no Brook Trout were found. Overall, 187 individual fish were collected from 9 different species including Yellow Perch and Yellow Bullhead Catfish and Bluegill Sunfish. Some of the species found are an indication of warmer water influence most likely from several lakes upstream of the sample location. These lake influences are having a detrimental effect on the stream and the wild trout population in it.

Recommendation: Due to the lack of evidence of reproducing trout found in 2015 further sampling at additional locations should be done to determine if wild trout can still be found reproducing in this stream.

Hakihokake Creek (trib.) (Wydner)

Date: 08/10/2015
County: Hunterdon
Township: Holland Twp.
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **Javes Rd., upstream of Wydner Farm bridge**

Fish Species	Number	Length (mm)
Chub, Creek	9	0 - 0
Dace, Blacknose	302	0 - 0
Dace, Longnose	33	0 - 0
Darter, Tessellated	17	0 - 0
Eel, American	59	0 - 0
Shiner, Common	1	0 - 0
Sucker, White	37	0 - 0
Trout, Brown (YOY)	17	78 - 111
Trout, Brown	5	171 - 231

Water Chemistry / Habitat

Water Temperature (C):	15.9
Dissolved Oxygen (mg/L):	10.5
Specific Conductance (uS/cm):	300.5
pH:	8.45
Alkalinity (mg/L):	129.5
Sample Length (m):	150
Habitat Assessment Score:	134 Sub-Optimal

Summary: This small *Trout Production* stream is also trout-stocked annually in the spring. When originally surveyed in 1970 only one Brown Trout was documented and the tributary was classified *Trout Maintenance*. Another survey conducted in 1990 further upstream (at the Rt.614 bridge) documented a wild Brown Trout population along with Slimy Sculpin, Blacknose Dace, and American Eel. As a result of this survey the tributary's surface water classification was upgraded to *Trout Production*. When last sampled further upstream (upstream of the Rt. 614 bridge) in 2012, the water temperature was quite cold (15.8°C on 7/28/120 and in addition to 187 Brown Trout (up to 296 mm (11.7 in)) sculpin, eels, chubs, and dace were documented. In 2015 the survey was conducted approximately 0.4 miles upstream from its confluence with Hakihokake Creek in the vicinity of the 1970 survey. In this survey 22 wild Brown Trout were captured, 5 were young-of-the-year, and the largest was 231 mm (9.1 in). No stocked trout were captured, though some Rainbow Trout were visible in the large pool immediately downstream of the farm lane culvert. The stream gradient was relative flat and the stream flowed through an active farm pasture where cattle (encountered during the survey) have unrestricted access to the stream. As a consequence the riparian zone is poorly vegetated on the eastern side, resulting in unprotected, eroding banks and in-stream siltation, as indicated by the sub-optimal habitat assessment score.

Recommendation: Angling on this trout-stocked stream should be assessed in the spring to determine if continued stocking is warranted given the presence of wild trout. The pasture should be fenced along the stream to prevent cattle from wandering into the stream at multiple locations and to allow riparian vegetation to become establish that will help prevent bank erosion, filter runoff, and shade the stream. Grants may be available through NRCS to fund this restoration activity if the private landowner is willing to participate. This 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. This stream should be periodically monitored at a minimum in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Hances Brook

Date: 07/29/2015
County: Warren
Township: Mansfield Twp.-Warren Co.
Drainage: Musconetcong River
Project: Wild Trout Stream Assessment
Location: **Route 57 bridge, upstream**

Fish Species	Number	Length (mm)
Chub, Creek	81	0 - 0
Dace, Blacknose	75	0 - 0
Dace, Longnose	10	0 - 0
Darter, Tessellated	33	0 - 0
Eel, American	57	0 - 0
Madtom, Margined	1	0 - 0
Pickerel, Chain	1	115 - 115
Shiner, Common	2	0 - 0
Sucker, White	45	0 - 0
Sunfish, Pumpkinseed	1	113 - 113
Trout, Brook	1	181 - 181

Water Chemistry / Habitat

Water Temperature (C): 22.5
Dissolved Oxygen (mg/L): 9.13
Specific Conductance (uS/cm): 233.7
pH: 7.54
Alkalinity (mg/L): 41.5
Sample Length (m): 150
Habitat Assessment Score: 147 Sub-Optimal

Summary: This Musconetcong River tributary is classified *Trout Production* and currently regulated as a *Wild Trout Stream*. When surveyed last year (2014), only five young-of-the-year Brook Trout were documented. This low abundance was cause for concern, and prompted a follow-up survey in 2015. A different site, further downstream (and just above Rt. 57), was selected in hopes that Brook Trout would be more abundant with increased flow. Unfortunately, only one trout was found, a wild Brook Trout measuring 181 mm (7.1 in). At this location, heavy deposits of silt and sand were observed in, and adjacent to, the stream channel where the remnants of an old dam were still visible. The sediment that accumulated behind the now-breached dam remains and continues to impact in-stream habitat conditions for trout. Elevated summer water temperatures may be problematic for trout, as suggested by the warm temperature recorded on the survey date (22.5°C at 12:49 pm). In addition, a farmer's pasture immediately upstream has little/no vegetated riparian zone and bank erosion is problematic.

Recommendation: The reason(s) for low Brook Trout abundance should be investigated further. Continuous water temperature monitoring is recommended to determine if summer water temperatures are problematic for trout. The stream reach that flows through the farm pasture adjacent to Hazen Road is a good candidate for Brook Trout habitat restoration and may be eligible for grants through NRCS. This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Knowlton Brook

Date: 08/18/2015
County: Warren
Township: Knowlton Twp.
Drainage: Delaware River (1)
Project: Trout Production Re-Inventory
Location: **off Knowlton Rd, (upstream of Rt. 46 bridge)**

Fish Species	Number	Length (mm)
Chub, Creek	50	0 - 0
Dace, Blacknose	276	0 - 0
Eel, American	9	0 - 0
Trout, Brown	1	270 - 270

Water Chemistry / Habitat

Water Temperature (C): 19.8
Dissolved Oxygen (mg/L): 8.51
Specific Conductance (uS/cm): 278.2
pH: 7.90
Alkalinity (mg/L): 94.5
Sample Length (m): 150
Habitat Assessment Score: 158 Sub-Optimal

Summary: This small stream drains directly into the Delaware River near Columbia. When previously surveyed (1990) a small number of wild Brown Trout (6 young-of-the-year and 10 older fish) were documented over a 60 m (200 ft) stretch, along with Blacknose Dace (50) and a few Bluegill (3). In the 2015 survey, conducted at the same location, the wild trout population appears to be struggling, with only one wild adult Brown Trout, 270 mm (10.6 in), found. The Rt. 46 culvert for this stream (located downstream of the survey location) was rebuilt/replaced within the past few years and additional hard armoring of the bank in the vicinity of the bridge has been proposed.

Recommendation: Work with NJDFW's Environmental Review Section to incorporate bioengineering into the bank stabilization plan and inspect the culvert to determine if low flow fish passage is problematic. Monitor this *Trout Production* stream more frequently (more than once every 20 years) at multiple locations (above and below the Rt. 46 culvert) to assess the status of the wild trout population.

Kymer Brook

Date: 09/09/2015
County: Sussex
Township: Andover Twp.
Drainage: Pequest River
Project: Native Species Inventory
Location: **Route 206 - below Gardners Pond**

Fish Species	Number	Length (mm)
Bullhead, Brown	1	0 - 0
Eel, American	3	0 - 0
Sunfish, Bluegill	6	0 - 0
Sunfish, Bluespotted	3	0 - 0

Water Chemistry / Habitat

Water Temperature (C):	N/A
Dissolved Oxygen (mg/L):	N/A
Specific Conductance (uS/cm):	N/A
pH:	N/A
Alkalinity (mg/L):	N/A
Sample Length (m):	200
Habitat Assessment Score:	N/A

Summary: This tributary to the Pequest River is in close proximity to previously documented Ironcolor Shiner populations, however none were found in this 200 meter Non-standardized survey. Ironcolor Shiners are one of the most rare freshwater fish species in NJ and are decreasing throughout their native range. This species is being evaluated in NJ to determine its state status, with preliminary indications that Endangered status may be warranted. Very few fish were encountered, however a noteworthy native species collected was Bluespotted Sunfish. It is interesting to note that isolated schools of Ironcolor Shiners were found approximately 600 meters downstream, but none in the upper reaches that seems to have similar, well vegetated habitat.

Recommendation: Additional surveys in the watershed are necessary to determine the current status and distribution of Ironcolor Shiners.

Non-Standardized Survey

Kymer Brook

Date: 09/09/2015
County: Sussex
Township: Andover Twp.
Drainage: Pequest River
Project: Native Species Inventory
Location: **Route 206, behind Forest Fire Service Division A Headquarters**

Fish Species	Number	Length (mm)
Shiner, Ironcolor	200 *	0 - 0
Unknown Esox spp.	1	0 - 0

* approximate number

Water Chemistry / Habitat

Water Temperature (C):	N/A
Dissolved Oxygen (mg/L):	N/A
Specific Conductance (uS/cm):	N/A
pH:	N/A
Alkalinity (mg/L):	N/A
Sample Length (m):	80
Habitat Assessment Score:	N/A

Summary: This tributary to the Pequest River is in close proximity to previously documented Ironcolor Shiner populations. A non-standardized electrofishing survey of approximately 80 meters was sampled to determine if Ironcolor Shiners are present. Several schools of Ironcolor Shiners were observed, totaling approximately 200 individuals. Ironcolor Shiners are one of the most rare freshwater fish species in NJ and are decreasing throughout their native range. This species is being evaluated in NJ to determine its state status, with preliminary indications that Endangered status may be warranted. No Largemouth Bass or sunfish were observed. One pickerel species was observed but not collected, therefore not identified to the species level. This area was impounded behind multiple beaver dams and well vegetated, with a distinct whitish sand and gravel substrate covered with detritus.

Recommendation: Additional surveys in the watershed are necessary to determine the current status and distribution of Ironcolor Shiners.

Non-Standardized Survey

Kymer Brook

Date: 09/09/2015
County: Sussex
Township: Green Twp.
Drainage: Pequest River
Project: Native Species Inventory
Location: **Brighton Road bridge**

Water Chemistry / Habitat

Water Temperature (C):	N/A
Dissolved Oxygen (mg/L):	N/A
Specific Conductance (uS/cm):	N/A
pH:	N/A
Alkalinity (mg/L):	N/A
Sample Length (m):	300
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Bass, Largemouth	5 *	0 - 0
Darter, Tessellated	300 *	0 - 0
Eel, American	10 *	0 - 0
Mudminnow, Eastern	1 *	0 - 0
Perch, Yellow	3 *	0 - 0
Pickerel, Redfin	3 *	0 - 0
Shiner, Ironcolor	25 *	0 - 0
Sucker, White	30 *	0 - 0
Sunfish, Bluegill	15 *	0 - 0
Sunfish, Redbreast	30 *	0 - 0

* approximate number

Summary: This tributary to the Pequest River is in close proximity to previously documented Ironcolor Shiner populations. A non-standardized electrofishing survey of approximately 300 meters was sampled to determine if Ironcolor Shiners are present. One school of Ironcolor Shiners was observed at this location. Ironcolor Shiners are one of the most rare freshwater fish species in NJ and are decreasing throughout their native range. This species is being evaluated in NJ to determine its state status, with preliminary indications that Endangered status may be warranted. This stream segment has a relatively unique character as it is composed of very clean white sand and gravel substrate, some submerged aquatic vegetation, and dominated by Tessellated Darters and freshwater mussels (shells were retained for identification by ENSP staff). Five Largemouth Bass and an abundance of Redbreast Sunfish were found at this site, therefore it should be monitored.

Recommendation: Additional surveys in the watershed are necessary to determine the current status and distribution of Ironcolor Shiners.

Non-Standardized Survey

Lopatcong Creek

Date: 08/12/2015
County: Warren
Township: Harmony Twp.
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **Route 519, Warren Co. Fairgrounds**

Water Chemistry / Habitat

Water Temperature (C):	17.9
Dissolved Oxygen (mg/L):	9.38
Specific Conductance (uS/cm):	243.9
pH:	7.86
Alkalinity (mg/L):	51
Sample Length (m):	150
Habitat Assessment Score:	158 Sub-Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	3	49 - 70
Chub, Creek	51	0 - 0
Dace, Blacknose	187	0 - 0
Darter, Tessellated	77	0 - 0
Eel, American	9	0 - 0
Lamprey, American Brook	2	0 - 0
Lamprey, Sea	2	0 - 0
Madtom, Margined	1	0 - 0
Pickerel, Chain	2	89 - 136
Shiner, Common	37	0 - 0
Sucker, White	64	0 - 0
Trout, Brown (YOY)	26	52 - 86
Trout, Brown	16	110 - 285
Trout, Rainbow	1	315 - 315

Summary: This *Trout Production* stream flows directly into the Delaware River at Phillipsburg and is stocked annually in the spring with Rainbow Trout. A total of three sites at (or in close proximity to) trout stocking locations were surveyed in 2015 to assess the status of wild trout population and the prevalence of hatchery-reared trout. The uppermost of the three surveys (described here) was conducted approximately 8.9 km (5.5 mi) upstream from the creek's confluence with the Delaware River, on a reach located within the Warren County Fairgrounds. Despite being upstream from the two other sites surveyed, the stream was warmer 17.9°C (64.2°F) indicating that springs are not as prevalent. The golf course immediately upstream from the fairgrounds likely contributes to higher summer water temperatures by maintaining an un-natural riparian zone (grass), exposing the stream to full sunlight throughout the day. Wild Brown Trout were not as abundant at this survey location compared to the two downstream sites. A total of 42 wild Brown Trout and 1 Rainbow Trout were present. The rainbow was a stocked fish, as indicated by its length and fin erosion. Eleven of the Brown Trout were greater than 177 mm (7 in) and of these, 7 were greater than 228 mm (9 in). Lower trout abundance in this upstream reach is likely due to a combination of warmer temperatures, less flow, and physical in-stream habitat differences associated with less flow. While conducting this electrofishing survey, stream flow (and turbidity) dramatically increased so much so that the survey had to be temporarily suspended until flow subsided. It was later learned that the Merrill Creek Reservoir Owners Group was exercising the valves on their pipeline which extends from the reservoir to the Delaware River four miles away. When this site was last surveyed in 2002 American Brook Lamprey were significantly more abundant (70 fish). Because this non-parasitic lamprey species is sensitive to environmental degradation, its decreased abundance at this site is cause for concern.

Recommendation: This 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. This stream should be periodically monitored at a minimum in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Lopatcong Creek

Date: 07/22/2015
County: Warren
Township: Lopatcong Twp.
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **Lock Street, downstream from uppermost bridge**

Water Chemistry / Habitat

Water Temperature (C):	15.4
Dissolved Oxygen (mg/L):	8.39
Specific Conductance (uS/cm):	414.8
pH:	7.66
Alkalinity (mg/L):	152
Sample Length (m):	150
Habitat Assessment Score:	130 Sub-Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	7	43 - 65
Chub, Creek	10	0 - 0
Dace, Blacknose	61	0 - 0
Darter, Tessellated	12	0 - 0
Eel, American	14	0 - 0
Shiner, Common	6	0 - 0
Sucker, White	5	0 - 0
Trout, Brown (YOY)	108	55 - 94
Trout, Brown	50	124 - 261
Trout, Rainbow	4	245 - 305

Summary: This *Trout Production* stream flows directly into the Delaware River at Phillipsburg and is stocked annually in the spring with Rainbow Trout. A total of three sites at (or in close proximity to) trout stocking locations were surveyed in 2015 to assess the status of wild trout population and the prevalence of hatchery-reared trout. The survey described here was conducted at a site between the two other sites, approximately 2 km (1.3 mi) upstream from the creek's confluence with the Delaware River in a residential area. The stream was quite cold, 15.4°C (59.7°F) on the date surveyed and the prevalence of spring houses adjacent to the creek indicates local springs greatly influence stream temperature, particularly during the summer. Although the habitat score was sub-optimal (130) the cold water temperature likely offsets any habitat limitations/deficiencies for trout. At this site wild Brown Trout were abundant (158 individuals), with 108 young-of-the-year and 50 older fish present. There were 17 Brown Trout greater than 177 mm (7 in) and of these, 3 were greater than 228 mm (9 in). The largest Brown Trout captured was 261 mm (10.3 in). Only four stocked Rainbow Trout (as indicated by its length and fin erosion) was encountered which suggests the impact of stocking on the wild Brown Trout population is short-lived. This stream may be a good candidate for a special wild trout stream regulation.

Recommendation: This 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. This stream should be periodically monitored at a minimum in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Lopatcong Creek

Date: 07/22/2015
County: Warren
Township: Phillipsburg Town
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **1127 S. Main Street, demolished dam behind Pursel's Agway**

Water Chemistry / Habitat

Water Temperature (C):	15.5
Dissolved Oxygen (mg/L):	10.2
Specific Conductance (uS/cm):	458
pH:	8.04
Alkalinity (mg/L):	159.5
Sample Length (m):	150
Habitat Assessment Score:	137 Sub-Optimal

Fish Species	Number	Length (mm)
Chub, Creek	6	0 - 0
Dace, Blacknose	4	0 - 0
Eel, American	50	0 - 0
Killifish, Banded	1	0 - 0
Lamprey, Sea	2	0 - 0
Sucker, White	3	0 - 0
Sucker, Unknown	49	0 - 0
Trout, Brown (YOY)	119	54 - 114
Trout, Brown	64	155 - 297
Trout, Rainbow	1	293 - 293

Summary: This *Trout Production* stream flows directly into the Delaware River at Phillipsburg and is stocked annually in the spring with Rainbow Trout. A total of three sites at (or in close proximity to) trout stocking locations were surveyed in 2015 to assess the status of wild trout population and the prevalence of hatchery-reared trout. The lowermost of the three surveys (described here) was conducted approximately 1 km (0.7 mi) upstream from the creek's confluence with the Delaware River, on a reach located behind the former Pursel Agway. The creek was restored at this location following the demolition of an 8.5 ft high mill dam in 2006. The stream was quite cold, 15.5°C (60°F) on the survey date and the spring emanating from spring house adjacent to mill is evidence that local springs greatly influence stream temperature, particularly during the summer. Wild Brown Trout were abundant at this site (183 individuals), with 119 young-of-the-year and 64 older fish present. There were 53 Brown Trout greater than 177 mm (7 in) and of these, 8 were greater than 228 mm (9 in). The largest Brown Trout captured was 297 mm (11.7 in). Only one stocked Rainbow Trout (as indicated by its length and fin erosion) was encountered which suggests the impact of stocking on the wild Brown Trout population is short-lived. This stream may be a good candidate for a special wild trout stream regulation.

Recommendation: This 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. This stream should be periodically monitored at a minimum in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Mill (Clove) Brook

Date: 08/13/2015
County: Sussex
Township: Montague Twp.
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **Route 23 bridge**

Fish Species	Number	Length (mm)
Bullhead, Brown	1	160 - 160
Dace, Blacknose	57	0 - 0
Dace, Longnose	18	0 - 0
Darter, Tessellated	3	0 - 0
Eel, American	8	0 - 0
Pickerel, Chain	1	130 - 130
Sucker, White	1	0 - 0
Sunfish, Redbreast	12	62 - 138
Trout, Brown	3	131 - 306

Water Chemistry / Habitat

Water Temperature (C): 19.8
Dissolved Oxygen (mg/L): 9.35
Specific Conductance (uS/cm): 297.6
pH: 7.85
Alkalinity (mg/L): 91.5
Sample Length (m): 150
Habitat Assessment Score: 169 Optimal

Summary: Mill (Clove) Brook has been regulated as a *Wild Trout Stream* since the adoption of this special regulation in 1990. In 2015, this stream was surveyed to assess the wild trout population. It was also sampled last summer, but due to the low trout numbers found in 2014, it was re-sampled this year slightly further upstream. Mill (Clove) Brook looks the part of a great wild trout stream, but unfortunately the trout population in the stream does not reflect that. Only 3 Brown Trout (0 young-of-the-year) were found at this new survey location in 2015. Previous surveys were conducted slightly downstream of this sample location in 1968, 1998, 2004 and in 2014 and found 10, 31, 16 and 14 Brown Trout respectively. Brook Trout were encountered at the downstream location in the past (two Brook Trout in both the 1968 and 1998 surveys), however, in 2004, 2014 and 2015 Brook Trout were absent. Stream temperatures (although probably not the only contributing factor) may be the biggest factor for the low trout populations in Mill (Clove) Brook as the water temperature found on this day was 19.8 degrees Celsius. Although 19.8 degrees Celsius is not a lethal temperature for wild trout, it is above optimal conditions adding stress to the trout populations and is likely contributing to the fact that the Brown Trout population is struggling and the Brook Trout population appears to have been lost from this location in the stream. The 19.8 degree Celsius reading is only a "snapshot in time" temperature reading and is likely to not be the highest temperature this stream experiences in a summer especially due to Montague Lake, an on stream impoundment upstream of the sampling location. On stream impoundments have been shown to dramatically increase water temperatures downstream of an impoundment. A total of 90 individual fish representing 6 different species were collected during this sampling.

Recommendation: This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*). Future surveys should continue to monitor the trout population in the upstream reaches of Clove Brook and Mill Brook upstream of Montague Lake.

Mill (Clove) Brook

Date: 08/13/2015
County: Sussex
Township: Montague Twp.
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **Unnamed Road off Old Mashipacong Rd., upstream of bridge**

Fish Species	Number	Length (mm)
Dace, Blacknose	307	0 - 0
Eel, American	1	0 - 0
Killifish, Banded	1	0 - 0
Shiner, Golden	39	0 - 0
Trout, Brook	6	123 - 197

Water Chemistry / Habitat

Water Temperature (C): 19
Dissolved Oxygen (mg/L): 9.8
Specific Conductance (uS/cm): 179
pH: 7.62
Alkalinity (mg/L): 21.5
Sample Length (m): 150
Habitat Assessment Score: 167 Optimal

Summary: A sample site off of Old Mashipacong Rd. was selected to determine the wild trout population of the stream. On August 13, an electrofishing survey was conducted and found 6 Brook Trout. The stream was running very low and 5 out of the 6 trout were found in the one deeper pool in the survey area. The low flow on an already small stream puts a lot of stress on a trout population. Three hundred fifty-four individual fish representing 6 different species were collected. The higher number of individual fish found indicates good production for fish in the stream, but low flows and higher temperatures may limit this stream from having a better wild trout population.

Recommendation: This 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. No further sampling is needed.

Mine Brook (Morris)

Date: 08/21/2015
County: Morris
Township: Mount Olive Twp.
Drainage: Musconetcong River
Project: Habitat Restoration
Location: **Mine Hill Road, adjacent to Hackettstown Storage Reservoir**

Fish Species	Number	Length (mm)
Bass, Largemouth	1	86 - 86
Dace, Blacknose	1	0 - 0
Eel, American	20	0 - 0
Sunfish, Bluegill	1	64 - 64
Sunfish, Pumpkinseed	4	73 - 102

Water Chemistry / Habitat

Water Temperature (C): 21.8
Dissolved Oxygen (mg/L): 8.18
Specific Conductance (uS/cm): 230.7
pH: 7.91
Alkalinity (mg/L): 33
Sample Length (m): 150
Habitat Assessment Score: 98 Marginal

Summary: Two impoundments are located on the mainstem of Mine Brook, a tributary to the Musconetcong River near Hackettstown. The uppermost impoundment, Mine Hill Reservoir (MHR), has a surface area of 5.1 acres. The lowermost impoundment, Hackettstown Storage Reservoir (HSR), located approximately 2.4 km (1.5 miles) downstream from MHR, has a surface area of 2.1 acres. A wild Brook Trout population inhabits the brook below the HSR dam (see 2015 survey results elsewhere in this report) but not further upstream of this reservoir. Just upstream of the HSR, Mine Brook is diverted into a concrete lined channel 2.4 m (7.9 ft) wide that runs alongside the reservoir a distance of approximately 180 m (600 feet) before connecting to the reservoir at the dam (see photo above). The diverted stream reach along the HSR had never been sampled so a survey was conducted to assess the fishery. Very few fish were encountered when the 150 m stretch was electrofished (20 American Eels, 4 Pumpkinseed, 1 Bluegill, 1 young-of-the-year Largemouth Bass, and 1 Blacknose Dace). The habitat assessment score was very low (98), a reflection of the poor fish habitat afforded by the unnatural concrete channel.

Recommendation: This brook is a good candidate for Brook Trout restoration. Removal of the reservoir dams upstream and restoration of the stream to a natural channel within the dry lake beds would significantly benefit Brook Trout by allowing the existing wild trout population downstream of the HSR to expand upstream and also decrease summer stream temperatures.

Mine Brook (Morris)

Date: 08/20/2015
County: Morris
Township: Mount Olive Twp.
Drainage: Musconetcong River
Project: Wild Trout Stream Assessment
Location: **Drakestown Road bridge, approx. 1 km upstream**

Fish Species	Number	Length (mm)
Chub, Creek	2	0 - 0
Dace, Blacknose	76	0 - 0
Eel, American	23	0 - 0
Trout, Brook (YOY)	4	65 - 81
Trout, Brook	8	119 - 249

Water Chemistry / Habitat

Water Temperature (C): 20.8
Dissolved Oxygen (mg/L): 10.09
Specific Conductance (uS/cm): 401.2
pH: 7.49
Alkalinity (mg/L): 30.5
Sample Length (m): 150
Habitat Assessment Score: 173 Optimal

Summary: The mainstem of this brook was surveyed in the reach downstream of the Hackettstown Storage Reservoir (HSR). When surveyed in this vicinity in 1989, Brook and Brown Trout reproduction was documented. Twenty years later (2009) only wild Brook Trout were present and appeared to be thriving. A total of 63 trout were captured (52 young-of-the-year (YOY) and 11 older fish over 100 m stretch), the largest measured 289 mm (11.4 in). In this 2015 survey the Brook Trout population appeared to be struggling, with only 4 YOY and 8 older fish captured over a 150 m stretch. The habitat assessment score, while still in the optimal range, dropped from 188 to 173, and a fine coating of silt was observed on the submerged rocks. This was surprising since the HSR is only about 400 m upstream, and should serve as a settling basin for silt and help moderate flows during/after storm events. Also, the 2015 survey was interrupted by a thunderstorm which caused a temporary, substantial increase in both flow and turbidity. There may be a small tributary that enters the brook just downstream of the Lower Mine Brook Reservoir that conveys stormwater runoff from Rt. 46 and the extensive housing development on the opposite side of this highway.

Recommendation: This brook is a good candidate for Brook Trout restoration. Removal of the reservoir dams upstream and restoration of the stream to a natural channel within the dry lake beds would significantly benefit Brook Trout by allowing the existing wild trout population downstream of the HSR to expand upstream and also decrease summer stream temperatures. The runoff situation should be investigated further and water temperature should be continuously monitored to determine if there is a problem with warm water in the summer (discharged from the reservoir and/or the runoff from the highway and housing development) that is negatively impacting the wild Brook Trout population. This 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. This stream should be monitored more frequently than the established schedule (every 20 years for a *Trout Production* stream) because of the decline in Brook Trout abundance.

Musconetcong River

Date: 07/23/2015
County: Warren
Township: Mansfield Twp.-Warren Co.
Drainage: Musconetcong River
Project: Habitat Restoration
Location: **Pt. Mountain Rd. bridge, upstream**

Water Chemistry / Habitat

Water Temperature (C):	20.6
Dissolved Oxygen (mg/L):	8.92
Specific Conductance (uS/cm):	506.4
pH:	8.34
Alkalinity (mg/L):	113
Sample Length (m):	150
Habitat Assessment Score:	161 Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	1	57 - 57
Bass, Rock	2	164 - 169
Bass, Smallmouth	6	53 - 70
Dace, Blacknose	13	0 - 0
Dace, Longnose	11	0 - 0
Darter, Tessellated	18	0 - 0
Eel, American	59	0 - 0
Madtom, Margined	1	0 - 0
Minnow, Cutlip	9	0 - 0
Shiner, Common	22	0 - 0
Sucker, White	3	0 - 0
Sunfish, Bluegill	2	137 - 181
Walleye	1	111 - 111

Summary: In 2015 two electrofishing surveys were conducted near Point Mountain to assess the fishery following completion of an extensive in-stream fish habitat improvement project completed earlier in the summer (June). The uppermost of the two surveys (described here) was conducted upstream of the Point Mountain Road bridge. Due to the width of the stream a crew of 10-12 people and three backpack electrofishers were used to sample the river. One of the anode poles used was 9-ft long and had been recently acquired to enhance our ability to sample deep/wide pools. A variety of fish species (13) were collected. Although the species collected were considered representative of the river, the overall number of fish collected was quite low. Despite flow that was significantly lower than normal, it was difficult to effectively sample the fish population and net fish due to high water velocity, pool depth, and river width. The newly constructed pools in the section surveyed provide excellent deep water habitat for fishes such as trout, suckers, bass and sunfish. However, these pools were so deep and wide they could not be effectively electrofished, even with a 9-ft pole (fish could still easily elude capture). No trout were captured and one walleye was collected, presumable an escapee from the Hackettstown State Fish hatchery (or possibly Lake Hopatcong).

Recommendation: From the Penwell Road bridge downstream to the Point Mountain Road bridge (a distance of 1.2 mi) the river is trout-stocked and regulated as a Year Round Trout Conservation Area. The regulation for this stretch should be re-evaluated to determine if it expanding it upstream or downstream would be desirable and if other restrictions (minimum size, daily creel, gear) should adjusted.

Musconetcong River

Date: 07/23/2015
County: Warren
Township: Mansfield Twp.-Warren Co.
Drainage: Musconetcong River
Project: Habitat Restoration
Location: **Pt. Mountain Rd. bridge, downstream**

Water Chemistry / Habitat

Water Temperature (C):	19.5
Dissolved Oxygen (mg/L):	8.25
Specific Conductance (uS/cm):	509.9
pH:	8.16
Alkalinity (mg/L):	113
Sample Length (m):	150
Habitat Assessment Score:	171 Optimal

Fish Species	Number	Length (mm)
Bass, Rock	1	165 - 165
Bass, Smallmouth	1	179 - 179
Dace, Blacknose	4	0 - 0
Dace, Longnose	11	0 - 0
Darter, Tessellated	19	0 - 0
Eel, American	112	0 - 0
Madtom, Margined	2	0 - 0
Minnow, Cutlip	15	0 - 0
Shiner, Common	26	0 - 0
Sucker, White	11	0 - 0
Sunfish, Redbreast	2	125 - 143
Trout, Brook	3	160 - 223
Trout, Brown	1	194 - 194

Summary: In 2015 two electrofishing surveys were conducted near Point Mountain to assess the fishery following completion of an extensive in-stream fish habitat improvement project completed earlier in the summer (June). The lowermost of the two surveys (described here) was conducted downstream of the Point Mountain Road bridge. Due to the width of the stream a crew of 10-12 people and three backpack electrofishers were used to sample the river. One of the anode poles used was 9-ft long and had been recently acquired to enhance our ability to sample deep/wide pools. A variety of fish species (13) were collected. Although the species collected were considered representative of the river, the overall number of fish collected was quite low. Despite flow that was significantly lower than normal, it was difficult to effectively sample the fish population and net fish due to high water velocity, pool depth, and river width. The newly constructed pools in the section surveyed provide excellent deep water habitat for fishes such as trout, suckers, bass and sunfish. However, these pools were so deep and wide they could not be effectively electrofished, even with a 9-ft pole (fish could still easily elude capture). Worth noting was the capture of four trout (three Brook and one Brown Trout) that were considered to be wild, naturally reproduced fish. The Brook Trout were captured at the mouth of a small tributary called Musconetcong River (trib.) (Point Mountain), which is classified *Trout Production.*

Recommendation: Downstream of the Point Mountain Road bridge the river is not current trout-stocked and the statewide general trout regulations apply. Consideration should be given to expanding the special regulation downstream of this bridge in lieu of expanding trout stocking into this downstream reach.

Musconetcong River

Date: 05/27/2015
County: Warren
Township: Pohatcong Twp.
Drainage: Musconetcong River
Project: Habitat Restoration
Location: **Route 519, immediately below Hughsville Dam**

Water Chemistry / Habitat

Water Temperature (C):	20
Dissolved Oxygen (mg/L):	8.29
Specific Conductance (uS/cm):	524.4
pH:	8.18
Alkalinity (mg/L):	118
Sample Length (m):	0
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Bass, Rock	7	137 - 245
Bass, Smallmouth	1	235 - 235
Dace, Blacknose	1	0 - 0
Darter, Shield	4	0 - 0
Darter, Tessellated	16	0 - 0
Eel, American	31	0 - 0
Fallfish	1	0 - 0
Killifish, Banded	7	0 - 0
Lamprey, Sea	3	0 - 0
Madtom, Margined	1	0 - 0
Minnow, Cutlip	5	0 - 0
Shiner, Common	2	0 - 0
Shiner, Golden	1	0 - 0
Sucker, White	5	0 - 480
Sunfish, Bluegill	2	124 - 135
Sunfish, Bluespotted	1	0 - 0
Sunfish, Pumpkinseed	1	128 - 128
Sunfish, Redbreast	5	76 - 116

Summary: This survey was conducted at the base of the Hughsville Dam. This dam is approximately 4 miles upstream from the river's confluence with the Delaware River and located just downstream of the Rt. 519 bridge in Warren Glen. Hughsville Dam is now the lowermost impediment to upstream fish migration on the Musconetcong River and its removal is planned for 2016. 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. Although assorted warmwater (non-anadromous) fish species were captured, but no anadromous species were encountered. The absence of anadromous fishes in this survey is not considered conclusive because the pools immediately below the dam were too wide and deep to be effectively electrofished (resident and migratory fishes present could easily elude capture).

Recommendation: It is difficult to sample the river due to its sheer size (width and depth). Other ways to assess the fishery and determine if anadromous fishes are utilizing this section of the river should be explored.

Papakating Creek

Date: 08/20/2015
County: Sussex
Township: Wantage Twp.
Drainage: Wallkill River
Project: Native Species Inventory
Location: **Roy Road**

Fish Species	Number	Length (mm)
Bass, Largemouth	13	70 - 114
Bass, Smallmouth	9	62 - 161
Chub, Creek	92	0 - 0
Crappie, Black	1	180 - 180
Darter, Tessellated	71	0 - 0
Mudminnow, Eastern	20	0 - 0
Pickerel, Redfin	2	132 - 134
Shiner, Spottail	29	0 - 0
Sucker, White	223	0 - 0
Sunfish, Bluegill	1	89 - 89
Sunfish, Green	1	92 - 92
Sunfish, Pumpkinseed	8	75 - 130
Sunfish, Redbreast	1	70 - 70

Water Chemistry / Habitat

Water Temperature (C):	26.6
Dissolved Oxygen (mg/L):	10.5
Specific Conductance (uS/cm):	399.7
pH:	8.33
Alkalinity (mg/L):	126.5
Sample Length (m):	150
Habitat Assessment Score:	88 Marginal (low gradient)

Summary: On August 20, Division staff sampled the Papakating Creek off of Roy Road with an electrofishing backpack to assess the current fish population at this site. Historical records show that a rare native species of shiner, the Bridle Shiner was found at this location in a survey done in 1968. The 2015 survey found 471 individual fish representing 13 different species, but unfortunately no Bridle Shiners were found. One possible reason for not finding Bridle Shiner from this location is the large shift in the fish assemblage. The 1968 survey found 10 different species. The 2015 survey found 13 different species with many non-native piscivore species like Largemouth Bass, Smallmouth Bass, Black Crappie and Green Sunfish present that were not found in 1968. The increase in predation on the Bridle Shiner is a potential contributor to the low or non-existent population of Bridle Shiner from this survey site.

Recommendation: Additional surveys in the area should be completed before claiming that Bridle Shiner has been eradicated from the area.

Parker Brook

Date: 07/06/2015
County: Sussex
Township: Montague Twp.
Drainage: Flat Brook
Project: Wild Trout Stream Assessment
Location: **Crigger Road (Stokes State Forest)**

Water Chemistry / Habitat

Water Temperature (C):	18.9
Dissolved Oxygen (mg/L):	9.05
Specific Conductance (uS/cm):	59.8
pH:	6.92
Alkalinity (mg/L):	N/A
Sample Length (m):	150
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Chub, Creek	28	0 - 0
Chubsucker, Creek	8	0 - 0
Dace, Blacknose	87	0 - 0
Dace, Longnose	1	0 - 0
Eel, American	13	0 - 0
Lamprey, Sea	1	0 - 0
Madtom, Margined	2	0 - 0
Minnow, Cutlip	6	0 - 0
Pickerel, Redfin	1	0 - 0
Shiner, Common	36	0 - 0
Sucker, White	7	0 - 0
Trout, Brook	2	115 - 129

Summary: Parker Brook has been regulated as a *Wild Trout Stream* since the adoption of this special regulation in 1990 and was sampled on July 6th 2015. It was also sampled last summer, but due to the low trout numbers found and low water conditions, it was re-sampled again this year. Trout numbers unfortunately remained low as we found only 2 Brook Trout in 2015. This stream was previously surveyed in 2014, 2004, 2000 and 1968 in which 3, 0, 1 and 38 Brook Trout were found respectively. Water temperature in the 2015 survey was 18.9°C which is a little warm for optimal / preferred Brook Trout temperature, but not out of the range of Brook Trout survival. The 2000 survey, which found only 1 Brook Trout, had a water temperature of 21.1°C which is above the range of good Brook Trout survival. These water temperature readings are understandably a single "snapshot in time" of the streams overall temperature regime, but do indicate that the trout population is under stress at least for an unknown duration of time in Parker Brook. In addition to the temperature stressors, Brook Trout are also facing higher competition for resources from additional species infiltrating the area in recent years. In 1968, 5 different species were found (Brook Trout, Blacknose Dace, Slimy Sculpin, Creek Chub, & White Sucker) during the survey and all 5 of these species are what you would typically find in a NJ Wild Brook Trout Stream. The surveys done since then all showed higher species diversity with species not typically associated with a reproducing trout stream hinting that the stream quality may be degrading. 2015 had the highest species diversity when 12 different fish species were found.

Recommendation: This 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. Further surveys need to be conducted in different locations to determine if the decreasing Brook Trout population found in past surveys is due to the likelihood of stream temperatures exceeding trout sustaining temperatures, if the low flows found in 2014 make the survey location a poor choice for finding wild trout, and/or if the influx of other species and their increase in competition for resources has displaced and relegated wild Brook Trout to other areas in Parker Brook. This stream should also be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Paulins Kill

Date: 06/08/2015
County: Warren
Township: Blairstown Twp.
Drainage: Paulins Kill
Project: Paulins Kill Restoration Assessment
Location: **Crisman Road, below Paulina Dam**

Water Chemistry / Habitat

Water Temperature (C):	20
Dissolved Oxygen (mg/L):	11.05
Specific Conductance (uS/cm):	445.5
pH:	8.44
Alkalinity (mg/L):	105
Sample Length (m):	76
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Bass, Rock	3	142 - 185
Bass, Smallmouth	9	105 - 166
Dace, Blacknose	1	0 - 0
Dace, Longnose	12	0 - 0
Darter, Shield	72	0 - 0
Darter, Tessellated	9	0 - 0
Eel, American	11	132 - 520
Fallfish	1	0 - 0
Madtom, Margined	25	0 - 0
Minnow, Cutlip	15	0 - 0
Shiner, Common	6	0 - 0
Shiner, Spotfin	2	0 - 0
Sucker, White	3	0 - 0
Sunfish, Bluegill	3	70 - 147
Sunfish, Pumpkinseed	1	125 - 125
Sunfish, Redbreast	13	60 - 158
Trout, Rainbow	1	276 - 276

Summary: This spring, the New Jersey Division of Fish & Wildlife's Bureau of Freshwater Fisheries has begun sampling the Paulins Kill to document current fish assemblages prior to the proposed removal of the Columbia Lake Dam. The Columbia Lake Dam is located approximately 1/2 mile from the Delaware River and acts as a major barrier to fish movement. Anadromous fish such as American Shad and Blueback Herring have been documented below the dam, but not above the dam. In addition to the restricted movement of these anadromous fish, restricted / impacted movement of American Eel by the Columbia Lake Dam has also been documented. This survey is one of 5 stream surveys done upstream of the Columbia Lake Dam documenting such restrictions. This survey was located just below the Paulina Dam.

This backpack and barge electrofishing survey found 187 individual fish from 17 different fish species. This survey found 0 American Shad, 0 Blueback Herring, and 11 American Eel (6 smaller than 200mm). The fish species and numbers documented in this survey clearly demonstrate the impacts to fish movement that the Columbia Lake Dam is having on the Paulins Kill. A native fish species of special interest to biologists based on its abundance statewide and habitat requirement (Shield Darter) was found at this location. The number of Shield Darters found is also of interest as they are not usually found in this abundance. The one Rainbow Trout found was recently stocked by the NJ Division of Fish and Wildlife's Pequest Trout Hatchery.

Recommendation: Additional sampling is planned, for the spring of 2016 and future years following the proposed removal of the Columbia Lake Dam at this site and several sampling sites above and below the Columbia Lake dam.

Non-Standardized Survey

Paulins Kill

Date: 05/27/2015
County: Warren
Township: Blairstown Twp.
Drainage: Paulins Kill
Project: Paulins Kill Restoration Assessment
Location: **Sunset Hill Road**

Water Chemistry / Habitat

Water Temperature (C):	22.1
Dissolved Oxygen (mg/L):	8.37
Specific Conductance (uS/cm):	559
pH:	8.16
Alkalinity (mg/L):	146
Sample Length (m):	150
Habitat Assessment Score:	103 Marginal

Fish Species	Number	Length (mm)
Bass, Rock	12	154 - 193
Bass, Smallmouth	11	84 - 176
Crappie, Black	3	94 - 190
Dace, Blacknose	4	0 - 0
Darter, Shield	4	0 - 0
Darter, Tessellated	24	0 - 0
Eel, American	3	435 - 571
Fallfish	1	0 - 0
Madtom, Margined	20	0 - 0
Minnow, Cutlip	3	0 - 0
Mudminnow, Eastern	1	0 - 0
Perch, Yellow	2	154 - 227
Shiner, Common	2	0 - 0
Sucker, White	2	0 - 0
Sunfish, Bluegill	17	73 - 194
Sunfish, Pumpkinseed	14	51 - 195
Sunfish, Redbreast	6	37 - 145

Summary: This spring, the New Jersey Division of Fish & Wildlife's Bureau of Freshwater Fisheries has begun sampling the Paulins Kill to document current fish assemblages prior to the proposed removal of the Columbia Lake Dam. The Columbia Lake Dam is located approximately 1/2 mile from the Delaware River and acts as a major barrier to fish movement. Anadromous fish such as American Shad and Blueback Herring have been documented below the dam, but not above the dam. In addition to the restricted movement of these anadromous fish, restricted / impacted movement of American Eel by the Columbia Lake Dam has also been documented. This survey is one of 5 stream surveys done upstream of the Columbia Lake Dam documenting such restrictions.

This backpack and barge electrofishing survey found 129 individual fish from 17 different fish species. This survey found 0 American Shad, 0 Blueback Herring, and only 3 American Eel (0 smaller than 200mm). The fish species and numbers documented in this survey clearly demonstrate the impacts to fish movement that the Columbia Lake Dam is having on the Paulins Kill. A native fish species of special interest to biologists based on its abundance statewide and habitat requirement (Shield Darter) was found at this location.

Recommendation: Additional sampling is planned, for the spring of 2016 and future years following the proposed removal of the Columbia Lake Dam at this site and several sampling sites above and below the Columbia Lake dam.

Non-Standardized Survey

Paulins Kill

Date: 05/21/2015
County: Warren
Township: Blairstown Twp.
Drainage: Paulins Kill
Project: Paulins Kill Restoration Assessment
Location: **Vail Rd. Bridge**

Water Chemistry / Habitat

Water Temperature (C):	16.5
Dissolved Oxygen (mg/L):	9.45
Specific Conductance (uS/cm):	452.9
pH:	8.36
Alkalinity (mg/L):	125
Sample Length (m):	150
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Bass, Largemouth	1	98 - 98
Bass, Rock	2	43 - 179
Bass, Smallmouth	21	93 - 233
Bullhead, Yellow	3	181 - 210
Crappie, Black	2	94 - 118
Dace, Longnose	3	0 - 0
Darter, Shield	18	0 - 0
Darter, Tessellated	16	0 - 0
Eel, American	10	0 - 664
Madtom, Margined	30	0 - 0
Minnow, Cutlip	5	0 - 0
Shiner, Satinfin	1	0 - 0
Sucker, White	10	0 - 0
Sunfish, Redbreast	9	80 - 157
Trout, Rainbow	69	0 - 0

Summary: This spring, the New Jersey Division of Fish & Wildlife's Bureau of Freshwater Fisheries has begun sampling the Paulins Kill to document current fish assemblages prior to the proposed removal of the Columbia Lake Dam. The Columbia Lake Dam is located approximately 1/2 mile from the Delaware River and acts as a major barrier to fish movement. Anadromous fish such as American Shad and Blueback Herring have been documented below the dam, but not above the dam. In addition to the restricted movement of these anadromous fish, restricted / impacted movement of American Eel by the Columbia Lake Dam has also been documented. This survey is one of 5 stream surveys done upstream of the Columbia Lake Dam documenting such restrictions.

This backpack & barge electrofishing survey found 200 individual fish from 15 different fish species. This survey found 0 American Shad, 0 Blueback Herring, and only 10 American Eel (0 smaller than 200mm). The fish species and numbers documented in this survey clearly demonstrate the impacts to fish movement that the Columbia Lake Dam is having on the Paulins Kill. A native fish species of special interest to biologists based on its abundance statewide and habitat requirement (Shield Darter) was found at this location. The number of Shield Darters found is also of interest as they are not usually found in this abundance. All of the Rainbow Trout found were recently stocked by the NJ Division of Fish and Wildlife's Pequest Trout Hatchery.

Recommendation: Additional sampling is planned, for the spring of 2016 and future years following the proposed removal of the Columbia Lake Dam at this site and several sampling sites above and below the Columbia Lake dam.

Non-Standardized Survey

Paulins Kill

Date: 05/21/2015
County: Warren
Township: Knowlton Twp.
Drainage: Paulins Kill
Project: Paulins Kill Restoration Assessment
Location: **Station Rd. Viaduct**

Water Chemistry / Habitat

Water Temperature (C):	15.3
Dissolved Oxygen (mg/L):	9.99
Specific Conductance (uS/cm):	455.3
pH:	8.39
Alkalinity (mg/L):	141
Sample Length (m):	150
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Bass, Smallmouth	7	93 - 284
Chub, Creek	1	0 - 0
Dace, Blacknose	5	0 - 0
Dace, Longnose	7	0 - 0
Darter, Shield	22	0 - 0
Darter, Tessellated	68	0 - 0
Eel, American	4	128 - 610
Fallfish	2	0 - 0
Madtom, Margined	19	0 - 0
Minnow, Cutlip	1	0 - 0
Shiner, Common	1	0 - 0
Shiner, Golden	1	0 - 0
Shiner, Satinfin	1	0 - 0
Shiner, Spottail	4	0 - 0
Sunfish, Redbreast	1	102 - 102
Trout, Brown	1	235 - 235
Trout, Rainbow	37	0 - 0

Summary: This spring, the New Jersey Division of Fish & Wildlife's Bureau of Freshwater Fisheries has begun sampling the Paulins Kill to document current fish assemblages prior to the proposed removal of the Columbia Lake Dam. The Columbia Lake Dam is located approximately 1/2 mile from the confluence with the Delaware River and acts as a major barrier to fish movement. Anadromous fish such as American Shad and Blueback Herring have been documented below the dam, but not above the dam. In addition to the restricted movement of these anadromous fish, restricted / impacted movement of American Eel by the Columbia Lake Dam has also been documented. This survey is one of 5 stream surveys done upstream of the Columbia Lake Dam documenting such restrictions.

This backpack & barge electrofishing survey found 182 individual fish from 17 different fish species. This survey found 0 American Shad, 0 Blueback Herring, and only 4 American Eel (1 smaller than 200mm). The fish species and numbers documented in this survey clearly demonstrate the impacts to fish movement that the Columbia Lake Dam is having on the Paulins Kill. A native fish species of special interest to biologists based on its abundance statewide and habitat requirement (Shield Darter) was found at this location. The number of Shield Darters found is also of interest as they are not usually found in this abundance. All of the Rainbow Trout found were recently stocked by the NJ Division of Fish and Wildlife's Pequest Trout Hatchery. The one Brown Trout collected was thought to be of wild origin.

Recommendation: Additional sampling is planned, for the spring of 2016 and future years following the proposed removal of the Columbia Lake Dam at this site and several sampling sites above and below the Columbia Lake dam.

Non-Standardized Survey

Paulins Kill

Date: 05/26/2015
County: Warren
Township: Knowlton Twp.
Drainage: Paulins Kill
Project: Paulins Kill Restoration Assessment
Location: **Warrington Rd to Brugler Rd**

Fish Species	Number	Length (mm)
Bass, Rock	3	172 - 194
Bass, Smallmouth	19	86 - 434
Bullhead, Brown	1	367 - 367
Catfish, Channel	2	346 - 355
Eel, American	13	335 - 801
Perch, Yellow	1	199 - 199
Sucker, White	42	0 - 0
Sunfish, Redbreast	9	68 - 181
Trout, Rainbow	10	300 - 342
Walleye	4	512 - 632

Water Chemistry / Habitat

Water Temperature (C): 21
Dissolved Oxygen (mg/L): 10.63
Specific Conductance (uS/cm): 508.2
pH: 8.24
Alkalinity (mg/L):
Sample Length (m): 515
Habitat Assessment Score: N/A

Summary: This spring, the New Jersey Division of Fish & Wildlife's Bureau of Freshwater Fisheries has begun sampling the Paulins Kill to document current fish assemblages prior to the proposed removal of the Columbia Lake Dam. The Columbia Lake Dam is located approximately 1/2 mile from the Delaware River and acts as a major barrier to fish movement. Anadromous fish such as American Shad and Blueback Herring have been documented below the dam, but not above the dam. In addition to the restricted movement of these anadromous fish, restricted / impacted movement of American Eel by the Columbia Lake Dam has also been documented. This survey is one of 5 stream surveys done upstream of the Columbia Lake Dam documenting such restrictions.

This boat electrofishing survey found 104 individual fish from 10 different fish species. This survey found 0 American Shad, 0 Blueback Herring, and 13 American Eel (0 smaller than 200mm). The fish species and numbers documented in this survey clearly demonstrate the impacts to fish movement that the Columbia Lake Dam is having on the Paulins Kill. All of the Rainbow Trout found were recently stocked by the NJ Division of Fish and Wildlife's Pequest Trout Hatchery. The four large walleye captured in this survey are thought to have come out a Swartswood Lake, a Division of Fish & Wildlife Walleye stocked lake located in the watershed upstream of this sampling location.

Recommendation: Additional sampling is planned, for the spring of 2016 and future years following the proposed removal of the Columbia Lake Dam at this site and several sampling sites above and below the Columbia Lake dam.

Non-Standardized Survey

Paulins Kill

Date: 05/14/2015
County: Warren
Township: Knowlton Twp.
Drainage: Paulins Kill
Project: Paulins Kill Restoration Assessment
Location: **Route 46 bridge**

Water Chemistry / Habitat

Water Temperature (C):	17.4
Dissolved Oxygen (mg/L):	9.14
Specific Conductance (uS/cm):	456.7
pH:	8.16
Alkalinity (mg/L):	142
Sample Length (m):	80
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Bass, Largemouth	1	332 - 332
Bass, Rock	2	165 - 211
Bass, Smallmouth	6	108 - 290
Bullhead, Yellow	1	153 - 153
Dace, Longnose	4	0 - 0
Darter, Shield	27	0 - 0
Darter, Tessellated	8	0 - 0
Eel, American	45	0 - 400
Fallfish	2	0 - 0
Madtom, Margined	8	0 - 0
Shad, American	3	458 - 501
Shad, Gizzard	16	0 - 415
Shiner, Golden	2	0 - 0
Sucker, White	13	0 - 0
Sunfish, Redbreast	14	75 - 170
Trout, Brown	1	158 - 158
Trout, Rainbow	2	224 - 230

Summary: This spring, the New Jersey Division of Fish & Wildlife's Bureau of Freshwater Fisheries began sampling the Paulins Kill to document current fish assemblages prior to the proposed removal of the Columbia Lake Dam. The Columbia Lake Dam is located approximately 1/2 mile from the confluence with the Delaware River and acts as a major barrier to fish movement. Anadromous fish such as American Shad and Blueback Herring have been documented below the dam, but not above the dam. In addition to the restricted movement of these anadromous fish, restricted / impacted movement of American Eel by the Columbia Lake Dam has also been documented.

This backpack & barge electrofishing survey found 155 individual fish from 17 different fish species. This survey found 3 American Shad, 0 Blueback Herring, and 45 American Eels. American Shad and American Eel found at this location shows that these anadromous and catadromous species are found downstream of the Columbia Lake dam. A native fish species of special interest to biologists based on its abundance statewide and habitat requirement (Shield Darter) was also found at this location. The number of Shield Darters found (27) is also of interest as they are not usually found in this abundance. All of the Rainbow Trout found were recently stocked by the NJ Division of Fish and Wildlife's Pequest Trout Hatchery. The one Brown Trout collected was thought to be of wild origin.

Recommendation: Additional sampling above and below the Columbia Lake Dam is planned for the spring of 2016 and subsequent years, following the proposed dam removal.

Non-Standardized Survey

Paulins Kill

Date: 05/20/2015
County: Warren
Township: Knowlton Twp.
Drainage: Paulins Kill
Project: Paulins Kill Restoration Assessment
Location: **Route 46 bridge**

Fish Species	Number	Length (mm)
Dace, Longnose	8	0 - 0
Darter, Shield	6	0 - 0
Darter, Tessellated	13	0 - 0
Eel, American	66	118 - 525
Madtom, Margined	1	0 - 0
Shad, American	3	419 - 510
Shad, Gizzard	8	361 - 446
Sucker, White	4	0 - 0
Sunfish, Redbreast	3	85 - 120
Trout, Rainbow	1	290 - 290

Water Chemistry / Habitat

Water Temperature (C): 18.6
Dissolved Oxygen (mg/L): 6.45
Specific Conductance (uS/cm): 433.5
pH: 8.01
Alkalinity (mg/L):
Sample Length (m): 80
Habitat Assessment Score: N/A

Summary: This spring, the New Jersey Division of Fish & Wildlife's Bureau of Freshwater Fisheries began sampling the Paulins Kill to document current fish assemblages prior to the proposed removal of the Columbia Lake Dam. The Columbia Lake Dam is located approximately 1/2 mile from the confluence with the Delaware River and acts as a major barrier to fish movement. Anadromous fish such as American Shad and Blueback Herring have been documented below the dam, but not above the dam. In addition to the restricted movement of these anadromous fish, restricted / impacted movement of American Eel by the Columbia Lake Dam has also been documented.

This backpack & barge electrofishing survey found 127 individual fish from 10 different fish species. This survey found 3 American Shad, 0 Blueback Herring, and 66 American Eels. American Shad and American Eel found at this location shows that these anadromous and catadromous species are found downstream of the Columbia Lake dam. A native fish species of special interest to biologists based on its abundance statewide and habitat requirement (Shield Darter) was found at this location. The Rainbow Trout found was recently stocked by the NJ Division of Fish and Wildlife's Pequest Trout Hatchery.

Recommendation: Additional sampling above and below the Columbia Lake Dam is planned for the spring of 2016 and subsequent years, following the proposed dam removal.

Non-Standardized Survey

Pequest River (trib.) (Green Twp.)

Date: 09/09/2015
County: Sussex
Township: Andover Twp.
Drainage: Pequest River
Project: Native Species Inventory
Location: **Route 206**

Fish Species	Number	Length (mm)
Shiner, Ironcolor	500 *	0 - 0

* approximate number

Water Chemistry / Habitat

Water Temperature (C):	N/A
Dissolved Oxygen (mg/L):	N/A
Specific Conductance (uS/cm):	N/A
pH:	N/A
Alkalinity (mg/L):	N/A
Sample Length (m):	N/A
Habitat Assessment Score:	N/A

Summary: Based on an electrofishing survey conducted in the Pequest River in 1989, a population of Ironcolor Shiners was discovered in this nearby tributary in 2005. Subsequent exploration and data collection have revealed other populations in the vicinity. A non-standardized survey was conducted this summer to determine if this population is still present. Ironcolor Shiners are one of the most rare freshwater fish species in NJ and are decreasing throughout their native range. This species is being evaluated in NJ to determine its state status, with preliminary indications that Endangered status may be warranted. Fortunately, this population seems to be doing well and no other fish species were observed. It is believed that the small on-stream dam isolates this population from the invasion of non-native predatory species that have been previously documented immediately downstream of the dam (i.e., Largemouth Bass and Bluegill). In fact, the only species previously documented upstream of this location are native species including Redfin Pickerel, Eastern Mudminnow, Creek Chubsucker, and American Eel.

Recommendation: Additional surveys in the watershed are necessary to determine the current status and distribution of Ironcolor Shiners. As previously indicated, the dam seems to play an important role and its removal would likely be detrimental to the Ironcolor Shiner populations that persist above the structure, therefore it is recommended to keep the dam in place.

Non-Standardized Survey

Pequest River (trib) (Readings Pond)

Date: 09/09/2015
County: Sussex
Township: Green Twp.
Drainage: Pequest River
Project: Native Species Inventory
Location: **Phillips Road bridge, downstream**

Fish Species	Number	Length (mm)
Bass, Largemouth	5	0 - 0
Bullhead, Brown	1	0 - 0
Eel, American	9	0 - 0
Pickerel, Redfin	2	0 - 0
Sunfish, Bluegill	8	0 - 0
Sunfish, Pumpkinseed	3	0 - 0

Water Chemistry / Habitat

Water Temperature (C):	N/A
Dissolved Oxygen (mg/L):	N/A
Specific Conductance (uS/cm):	N/A
pH:	N/A
Alkalinity (mg/L):	N/A
Sample Length (m):	40
Habitat Assessment Score:	N/A

Summary: This tributary is in close proximity to previously documented Ironcolor Shiner populations. A non-standardized electrofishing survey of approximately 40 meters was sampled to determine if Ironcolor Shiners are present, however none were encountered. Ironcolor Shiners are one of the most rare freshwater fish species in NJ and are decreasing throughout their native range. This species is being evaluated in NJ to determine its state status, with preliminary indications that Endangered status may be warranted. A non-native fish assemblage was quickly realized, which was predominantly composed of Largemouth Bass and Bluegill, making the presence of Ironcolor Shiners less likely due to predation pressure.

Recommendation: Additional surveys in the watershed are necessary to determine the current status and distribution of Ironcolor Shiners.

Non-Standardized Survey

Pohatcong Creek

Date: 07/09/2015
County: Warren
Township: Mansfield Twp.-Warren Co.
Drainage: Pohatcong Creek
Project: Classification
Location: **Valley Road bridge, downstream**

Fish Species	Number	Length (mm)
Chub, Creek	17	0 - 0
Dace, Blacknose	152	0 - 0
Darter, Tessellated	6	0 - 0
Eel, American	3	0 - 0
Minnow, Cutlip	2	0 - 0
Sucker, White	12	0 - 0
Sunfish, Bluegill	1	53 - 53
Trout, Brown (YOY)	5	59 - 80
Trout, Brown	4	145 - 205
Trout, Rainbow	1	286 - 286

Water Chemistry / Habitat

Water Temperature (C):	19.1
Dissolved Oxygen (mg/L):	9.46
Specific Conductance (uS/cm):	155.4
pH:	7.73
Alkalinity (mg/L):	33
Sample Length (m):	150
Habitat Assessment Score:	158 Sub-Optimal

Summary: Three sites on Pohatcong Creek, a trout-stocked stream in Warren County, were surveyed in 2015 to assess the fishery and document the abundance of wild and stocked trout. The current surface water classification of the creek at all three sites is *Trout Maintenance*. The uppermost of the three surveys (described here) was conducted downstream of Valley Road (a.k.a. Karrsville Road) bridge. In this survey nine wild Brown Trout (including five young-of-the-year (YOY) fish) and one stocked Rainbow Trout (determined by length and fin erosion) were captured. This low number of wild Brown Trout was unexpected. A site surveyed in 2004 (Mitchell Road bridge, 1.2 km upstream) yielded 113 Brown Trout, including 46 YOY. Another site, approximately 1.5 km downstream of Valley Road bridge, was surveyed in 2010 and 34 wild Brown Trout, including 12 YOY were captured there. The differences in trout abundance likely a reflection of demographic stochasticity and habitat differences that occur in the wild. The data collected at this location indicates a surface water classification upgrade to from *Trout Maintenance* to *Trout Production* in this reach is warranted.

Recommendation: The data from this and other surveys conducted on Pohatcong Creek since 2010 that document wild Brown Trout reproduction upstream of the Rt. 31 bridge should be used to upgrade the surface water classification from *Trout Maintenance* to *Trout Production* from the Karrsville bridge downstream to the Rt. 31 bridge. This 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. This stream should be periodically monitored at a minimum in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Pohatcong Creek

Date: 07/09/2015
County: Warren
Township: Washington Twp.-Warren Co.
Drainage: Pohatcong Creek
Project: Classification
Location: **Route 31 bridge, upstream**

Water Chemistry / Habitat

Water Temperature (C):	19.5
Dissolved Oxygen (mg/L):	8.82
Specific Conductance (uS/cm):	185.4
pH:	7.82
Alkalinity (mg/L):	34
Sample Length (m):	150
Habitat Assessment Score:	163 Optimal

Fish Species	Number	Length (mm)
Dace, Blacknose	59	0 - 0
Dace, Longnose	7	0 - 0
Darter, Tessellated	16	0 - 0
Eel, American	6	0 - 0
Fallfish	16	0 - 0
Minnow, Cutlip	26	0 - 0
Shiner, Common	8	0 - 0
Sucker, White	19	0 - 0
Sunfish, Redbreast	9	79 - 115
Trout, Brown (YOY)	2	65 - 68
Trout, Brown	6	176 - 350
Trout, Rainbow	1	327 - 327

Summary: Three sites on Pohatcong Creek, a trout-stocked stream in Warren County, were surveyed in 2015 to assess the fishery and document the abundance of wild and stocked trout. The current surface water classification of the creek at all three sites is *Trout Maintenance*. The survey described here is located between the two other sites surveyed in 2015. A total of eight wild Brown Trout (including two young-of-the-year fish) and one stocked Rainbow Trout (determined by length and fin erosion) were captured. The data collected at this location indicates a surface water classification upgrade to from *Trout Maintenance* to *Trout Production* in this reach is warranted.

Recommendation: The data from this and other surveys conducted on Pohatcong Creek since 2010 that document wild Brown Trout reproduction upstream of the Rt. 31 bridge should be used to upgrade the surface water classification from *Trout Maintenance* to *Trout Production* from the Karrsville bridge downstream to the Rt. 31 bridge. This 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.

Pohatcong Creek

Date: 07/07/2015
County: Warren
Township: Greenwich Twp.-Warren Co.
Drainage: Pohatcong Creek
Project: Classification
Location: **Route 637, upstream from farmers bridge (Beatty's Farm)**

Water Chemistry / Habitat

Water Temperature (C):	20
Dissolved Oxygen (mg/L):	9.28
Specific Conductance (uS/cm):	290.2
pH:	8.21
Alkalinity (mg/L):	59
Sample Length (m):	150
Habitat Assessment Score:	150 Sub-Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	1	50 - 50
Dace, Blacknose	20	0 - 0
Dace, Longnose	25	0 - 0
Darter, Shield	4	0 - 0
Darter, Tessellated	13	0 - 0
Eel, American	70	0 - 0
Minnow, Cutlip	8	0 - 0
Sucker, White	9	0 - 0
Trout, Brown (YOY)	1	71 - 71
Trout, Brown	8	128 - 253

Summary: Three sites on Pohatcong Creek, a trout-stocked stream in Warren County, were surveyed in 2015 to assess the fishery and document the abundance of wild and stocked trout. The current surface water classification of the creek at all three sites is *Trout Maintenance*. The lowermost of the three surveys (described here) was conducted off Rt. 637 south of Stewartsville. A total of nine wild Brown Trout (including one young-of-the-year (YOY) fish) were captured. Although trout are stocked at this survey location, none were captured. When conducting this survey it was initially thought that the stream channel was braided. But upon closer inspection, one of the braids was actually a small tributary/spring hole, as evidenced by its extremely cold water temperature (10.2°C). Eleven YOY trout (10 Brown Trout and 1 Brook Trout) were present in this tributary (these fish were not considered to be residents of the mainstem). The data collected at this location indicates a surface water classification upgrade to from *Trout Maintenance* to *Trout Production* in this reach is warranted.

Recommendation: Additional surveys should be conducted on this stream between the Rt. 31 and Rt. 519 bridges (a stream mile distance of approximately 16 miles) to provide data to determine the stream section(s) that warrant upgrade to *Trout Production*. This 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.

Shabakunk Creek

Date: 09/03/2015
County: Mercer
Township: Ewing Twp.
Drainage: Delaware River (11)
Project: Native Species Inventory
Location: **Green Lane Bridge, upstream**

Water Chemistry / Habitat

Water Temperature (C):	24.3
Dissolved Oxygen (mg/L):	5.33
Specific Conductance (uS/cm):	374.8
pH:	7.69
Alkalinity (mg/L):	57
Sample Length (m):	150
Habitat Assessment Score:	151 Sub-Optimal (low gradient)

Fish Species	Number	Length (mm)
Bass, Largemouth	42	52 - 200
Bullhead, Yellow	1	158 - 158
Chub, Creek	16	0 - 0
Darter, Tessellated	59	0 - 0
Eel, American	44	0 - 0
Killifish, Banded	26	0 - 0
Shiner, Spottail	50	0 - 0
Sucker, White	10	0 - 0
Sunfish, Bluegill	5	31 - 105
Sunfish, Pumpkinseed	1	96 - 96
Sunfish, Redbreast	35	40 - 140

Summary: When last surveyed in 1971, Shabakunk Creek was home to a native fish assemblage of nine species, including the rare Bridle Shiner. Unfortunately, the fish assemblage has shifted and no Bridle Shiners were encountered. The Bridle Shiner, one of the state's most rare species, is being evaluated in NJ to determine its state status, with preliminary indications that Endangered status may be warranted. An electrofishing survey was conducted this summer to determine if this population is still present. Unfortunately for the Ironcolor Shiner, 42 Largemouth Bass, 35 Redbreast Sunfish, and 5 Bluegills were present, likely extirpating Bridle Shiners from this location. Two other native species that were not found during this survey include Redfin Pickerel and Common Shiner. The habitat seems adequate for Bridle Shiners, composed of woody debris, deep slow pools, relatively clean substrate, and good vegetative protection, however Ceva Lake and Sylvia Lake (approximately ¼ mile upstream from site) likely contribute the high numbers of Largemouth Bass.

Recommendation: Additional surveys in the watershed are necessary to determine the current status and distribution of Bridle Shiners.

Sparta Glen Brook

Date: 07/21/2015
County: Sussex
Township: Sparta Twp.
Drainage: Wallkill River
Project: Habitat Restoration
Location: **Rt. 620 Sparta Glen Park, area of massive landslide**

Fish Species	Number	Length (mm)
Chub, Creek	7	0 - 0
Dace, Blacknose	221	0 - 0
Dace, Longnose	213	0 - 0
Trout, Brook	2	141 - 307

Water Chemistry / Habitat

Water Temperature (C): 20.1
Dissolved Oxygen (mg/L): 10.69
Specific Conductance (uS/cm): 467.6
pH: 8.16
Alkalinity (mg/L): 111
Sample Length (m): 150
Habitat Assessment Score: 130 Sub-Optimal

Summary: Sparta Glen Brook Restoration project is a project that 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. The restoration efforts are needed and hopefully will help a struggling Brook Trout population return to a stable population. This area was sampled in 2001 after the initial rain event and again in 2009 and found 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, found 30 Brook Trout (10 YOY). This survey shows that the stream can support a relatively large Brook Trout population if habitat conditions were to improve to a pre-landslide level. Overall, the survey found 443 individual fish representing 4 different species. 443 individual fish collected also indicates that the stream is still highly productive and that the food available in the stream can still support a more abundant fish population.

Recommendation: Additional surveys should be completed in the restoration area after the restoration is completed in 2016 to monitor the success of the restoration efforts.

Spring Mills Brook

Date: 08/10/2015
County: Hunterdon
Township: Holland Twp.
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **Route 519 bridge, upstream**

Fish Species	Number	Length (mm)
Chub, Creek	6	0 - 0
Dace, Blacknose	223	0 - 0
Dace, Longnose	6	0 - 0
Darter, Tessellated	10	0 - 0
Eel, American	18	0 - 0
Trout, Brown (YOY)	127	63 - 112
Trout, Brown	33	151 - 429

Water Chemistry / Habitat

Water Temperature (C): 15.7
Dissolved Oxygen (mg/L): 9.92
Specific Conductance (uS/cm): 321
pH: 8.24
Alkalinity (mg/L): 105
Sample Length (m): 150
Habitat Assessment Score: 178 Optimal

Summary: Spring Mills Brook is a tributary to Hakihokake Creek, which flows directly into the Delaware River in Milford (NJ). It was stocked annually in the spring with trout until 2010. Five electrofishing surveys have been conducted on this stream prior to 2015, at three different locations. In 1970 two sites were surveyed. The lowermost site (near the stream's confluence with Hakihokake Creek) did not document trout, whereas the upper site (off Spring Gardens Rd) documented Brown Trout reproduction (13 trout total, 5 were young-of-the-year). As a result of these two surveys the upper stream reach was classified *Trout Production* and the lower reach was classified *Trout Maintenance*. Later, a survey conducted in 1998 in the *Trout Maintenance* reach documented the presence of wild Brown Trout (12 YOY and 12 older fish) as well as several stocked trout (1 Brook and 2 Rainbow Trout). In 2001 the upstream site surveyed in 1970 was re-surveyed and 68 wild Brown Trout, including 5 harvestable trout, 233 – 286 mm (9.2- 11.3 in), were documented. In 2010 trout stocking was discontinued on this stream to allow the wild Brown Trout to provide a recreational trout fishery. In 2013 the site originally surveyed in 1998 was re-surveyed and a small number of wild Brown Trout (10), in addition to other fish species that commonly co-occur with wild trout, were present. None of the trout in this survey exceed the minimum harvestable size of 229 mm (9 in).

In 2015 a new location was chosen for survey. Wild Brown Trout were abundant at this site (160 individuals), with 127 young-of-the-year and 33 older fish present. There were 24 Brown Trout greater than 177 mm (7 in), of which 10 were greater than 228 mm (9 in). The largest Brown Trout was 429 mm (16.9 in). A sharp bend in the stream combined with a downed tree created a large, deep pool that provided excellent cover for the larger trout residing there. The cold water temperature observed, which the stream's name implies, is also very favorable for trout. An excellent, fishable population of wild Brown Trout resides in this stream reach, however, anglers may be unaware of this opportunity now that stocking has been discontinued. This stream may be a good candidate for a special wild trout stream regulation, however, the limited public access is a concern.

Recommendation: Additional surveys are not necessary at this time. This 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. This stream should be periodically monitored in accordance with the established schedule (every 20 years for a *Trout Production* stream).

Stephensburg Brook

Date: 07/13/2015
County: Morris
Township: Washington Twp.-Morris Co.
Drainage: Musconetcong River
Project: Temperature Study - TP Streams
Location: **Stephensburg Road, house # 178**

Fish Species	Number	Length (mm)
Chub, Creek	5	0 - 0
Dace, Blacknose	89	0 - 0
Dace, Longnose	4	0 - 0
Darter, Tessellated	3	0 - 0
Eel, American	39	0 - 0
Trout, Brook (YOY)	41	52 - 80
Trout, Brook	5	132 - 178
Trout, Brown (YOY)	14	52 - 65
Trout, Brown	2	130 - 182

Water Chemistry / Habitat

Water Temperature (C): 19.3
Dissolved Oxygen (mg/L): 8.57
Specific Conductance (uS/cm): 270.7
pH: 7.83
Alkalinity (mg/L): 30
Sample Length (m): 150
Habitat Assessment Score: 154 Sub-Optimal

Summary: This tributary of the Musconetcong River was electrofished on July 13 to address two project needs: (1) to assess the wild trout population structure relative to the stream temperature regime and (2) to assess the wild trout population and its status as a currently regulated *Wild Trout Stream* (WTS). Wild Brook Trout were first found here in a survey completed in 1970 and also in 2002, then in a survey conducted last year, wild Brown Trout were first documented in this stream. The status of Brook Trout is being evaluated in NJ, with preliminary indications that Special Concern status may be warranted. Species encountered during this survey included 45 wild Brook Trout ranging from 52 – 178 mm (2.0 – 7.0 in), including 41 young-of-the-year (YOY), and 16 wild Brown Trout ranging from 52 – 182 mm (2.0 – 7.2 in), including 14 YOY. Not many adults were found in this survey, which is consistent with what was captured last year (2 adult wild Brook Trout). Furthermore, access in this section, close to the confluence with the Musconetcong River, is limited by the amount of private property.

Recommendation: This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide in better management of our *Trout Production* streams. Information from the surveys done this year and the past will be used to determine and form new Wild Trout Stream regulations. In addition, this 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Stony Brook (Sussex)

Date: 07/06/2015
County: Sussex
Township: Sandyston Twp.
Drainage: Flat Brook
Project: Wild Trout Stream Assessment
Location: **Kittle Rd & Coursen Rd Intersection**

Fish Species	Number	Length (mm)
Dace, Blacknose	142	0 - 0
Eel, American	26	0 - 0
Sunfish, Bluegill	8	41 - 130

Water Chemistry / Habitat

Water Temperature (C): 21.8
Dissolved Oxygen (mg/L): 8.47
Specific Conductance (uS/cm): 27.4
pH: 6.96
Alkalinity (mg/L): 5
Sample Length (m): 150
Habitat Assessment Score: 174 Optimal

Summary: Stony Brook has been regulated as a *Wild Trout Stream* since the adoption of this special regulation in 1990 and was sampled on July 6. It was also sampled last summer, but due to the low trout numbers found (12 Brook Trout) it was re-sampled again this year. Stony Brook was sampled in two different locations in 2015. This survey was done just below Stony Lake, upstream of any tributaries that enter the stream below Stony Lake to determine the effect Stony Lake is having on the stream. It was concluded that Stony Lake is having a major detrimental effect on the health of Stony Brook as the water temperature (21.8 degrees Celsius) found this early in the summer was above a sustainable Brook Trout population temperature range. Not surprisingly, we did not find any Brook Trout at this survey location. Another survey located further downstream away from Stony Lake was also done this summer to see if more suitable water temperatures can be found that support Brook Trout. A total of 176 individual fish representing 3 different species were found.

Recommendation: This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Stony Brook (Sussex)

Date: 08/12/2015
County: Sussex
Township: Sandyston Twp.
Drainage: Flat Brook
Project: Wild Trout Stream Assessment
Location: **Kittle Rd**

Fish Species	Number	Length (mm)
Chub, Creek	1	0 - 0
Dace, Blacknose	61	0 - 0
Dace, Longnose	23	0 - 0
Eel, American	14	0 - 0
Sculpin, Slimy	13	0 - 0
Sunfish, Bluegill	1	69 - 69
Trout, Brook (YOY)	1	70 - 70
Trout, Brook	3	147 - 228

Water Chemistry / Habitat

Water Temperature (C): 17.2
Dissolved Oxygen (mg/L): 8.7
Specific Conductance (uS/cm): 61.3
pH: 8.28
Alkalinity (mg/L): 23
Sample Length (m): 150
Habitat Assessment Score: 172 Optimal

Summary: Stony Brook has been regulated as a *Wild Trout Stream* since the adoption of this special regulation in 1990 and was sampled on August 12. It was also sampled last summer, but due to the low trout numbers found (12 Brook Trout) it was re-sampled again this year. Stony Brook was sampled in two different locations in 2015. This survey was done near the confluence with the Big Flat Brook. Another survey upstream of this location, just below Stony Lake was done earlier in the summer and did not find any trout species. This survey found 3 adult/juvenile and 1 young-of-the-year Brook Trout. Although water temperatures were better near the confluence of the Big Flat Brook and a few trout were found, the impacts from Stony Lake are severely effecting the temperatures and trout population of Stony Brook. A total of 117 individual fish were found from 7 different species.

Recommendation: This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Van Campens Brook

Date: 07/24/2015
County: Warren
Township: Hardwick Twp.
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **Blairstown - Millbrook Road Bridge**

Fish Species	Number	Length (mm)
Chub, Creek	4	0 - 0
Dace, Blacknose	70	0 - 0
Sucker, White	4	0 - 0
Trout, Brook (YOY)	24	52 - 88
Trout, Brook	35	110 - 184
Trout, Rainbow (YOY)	6	48 - 59
Trout, Rainbow	13	114 - 205

Water Chemistry / Habitat

Water Temperature (C): 18
Dissolved Oxygen (mg/L): 9.5
Specific Conductance (uS/cm): 57.7
pH: 7.66
Alkalinity (mg/L): 16.5
Sample Length (m): 150
Habitat Assessment Score: 178 Optimal

Summary: This stream is located within the Delaware Water Gap National Recreation Area (DEWA) and is considered one of NJ's best *Wild Trout Streams* due the abundance and occurrence of all three trout species (brook, brown, and rainbow). It was the first stream to have special fishing regulations for wild trout, beginning in the 1979 as a *Natural Trout Fishing Area*, and later designated as a *Wild Trout Stream* when this regulation was implemented in 1990 (and trout stocking completely ceased). This stream has been sampled numerous times since 1968. The trout species distribution pattern found in the 2015 surveys mimicked those observed in the past, where Brook Trout dominate the headwaters, then transitions to Rainbow Trout, and finally to Brown Trout. The Brook Trout and Brown Trout populations in Van Campens Brook are separated by several barriers. Some of these barriers are natural (i.e. waterfalls) and some are old dams that only partially block movement depending on flow conditions. These barriers may be benefiting the Brook Trout population as Brown Trout can have a detrimental effect on Brook Trout populations where the two are found together. In many cases, Brown Trout completely out-compete Brook Trout for resources and Brook Trout can be lost from the stream completely. The following summarizes data collected at the most upstream of the four locations surveyed in 2015.

In this 2015 survey, conducted approximately 300m downstream of Millbrook Rd. in Millbrook Village, 19 wild Rainbow Trout and 59 wild Brook Trout were found. None of the trout exceeded the minimum harvestable size (229 mm (9 in)). The largest was a Rainbow Trout measuring 205 mm (8.1 in). A nearby 2014 survey conducted upstream of this location found 84 total trout (60% Brook Trout / 40% Rainbow Trout). This compares very similarly to the 2015 survey where 78 total trout (75% Brook Trout / 25% Rainbow Trout) were found. Overall, 156 individual fish were found representing 5 different species.

Recommendation: This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Van Campens Brook

Date: 08/18/2015
County: Warren
Township: Hardwick Twp.
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **Watergate Rec Area, off Old Mine Rd.**

Fish Species	Number	Length (mm)
Bass, Largemouth	2	73 - 74
Bullhead, Yellow	1	177 - 177
Chub, Creek	28	0 - 0
Dace, Blacknose	174	0 - 0
Eel, American	5	0 - 0
Sucker, White	18	0 - 0
Sunfish, Pumpkinseed	1	92 - 92
Sunfish, Redbreast	7	77 - 172
Trout, Brook (YOY)	10	56 - 83
Trout, Brook	3	131 - 189
Trout, Rainbow	4	130 - 220

Water Chemistry / Habitat

Water Temperature (C): 21.4
Dissolved Oxygen (mg/L): 9.23
Specific Conductance (uS/cm): 98.8
pH: 7.57
Alkalinity (mg/L): 27.5
Sample Length (m): 150
Habitat Assessment Score: 168 Optimal

Summary: This stream is located within the Delaware Water Gap National Recreation Area (DEWA) and is considered one of NJ's best *Wild Trout Streams* due the abundance and occurrence of all three trout species (brook, brown, and rainbow). It was the first stream to have special fishing regulations for wild trout, beginning in the 1979 as a *Natural Trout Fishing Area*, and later designated as a *Wild Trout Stream* when this regulation was implemented in 1990 (and trout stocking completely ceased). This stream has been sampled numerous times since 1968. The trout species distribution pattern found in the 2015 surveys mimicked those observed in the past, where Brook Trout dominate the headwaters, then transitions to Rainbow Trout, and finally to Brown Trout. The Brook Trout and Brown Trout populations in Van Campens Brook are separated by several barriers. Some of these barriers are natural (i.e. waterfalls) and some are old dams that only partially block movement depending on flow conditions. These barriers may be benefiting the Brook Trout population as Brown Trout can have a detrimental effect on Brook Trout populations where the two are found together. In many cases, Brown Trout completely out-compete Brook Trout for resources and Brook Trout can be lost from the stream completely. The following summarizes data collected at the second most upstream location of the four locations surveyed in 2015. This location is found between several known barriers to fish movement.

In this 2015 survey, conducted near the Watergate Recreation Area, 13 wild Brook Trout, 4 wild Rainbow Trout and 0 Brown Trout were found. None of the trout exceeded the minimum harvestable size (229 mm (9 in)). The largest was a Rainbow Trout measuring 220 mm (8.7 in). It appears that Brown Trout have not made it to this location yet, but a nearby 2014 survey located downstream off Brink Rd. found several Brown Trout. This suggests that there is a possible barrier between these two sites possibly restricting Brown Trout movements. Overall, 253 individual fish were found representing 10 different species.

Recommendation: This 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. The stream should be visually surveyed looking for any potential barriers to fish movement between Brink Rd where Brown Trout were found and this survey location.

Van Campens Brook

Date: 08/18/2015
County: Warren
Township: Hardwick Twp.
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **Van Campens Glen**

Water Chemistry / Habitat

Water Temperature (C):	20.1
Dissolved Oxygen (mg/L):	9.26
Specific Conductance (uS/cm):	94
pH:	7.89
Alkalinity (mg/L):	35
Sample Length (m):	150
Habitat Assessment Score:	176 Optimal

Fish Species	Number	Length (mm)
Bass, Smallmouth	7	62 - 72
Bullhead, Yellow	1	174 - 174
Chub, Creek	2	0 - 0
Dace, Blacknose	71	0 - 0
Dace, Longnose	14	0 - 0
Eel, American	49	0 - 0
Fallfish	10	0 - 0
Madtom, Margined	1	0 - 0
Minnow, Cutlip	10	0 - 0
Sucker, White	6	0 - 0
Sunfish, Green	1	115 - 115
Sunfish, Pumpkinseed	1	100 - 100
Trout, Brown (YOY)	6	81 - 95
Trout, Brown	22	141 - 490

Summary: This stream is located within the Delaware Water Gap National Recreation Area (DEWA) and is considered one of NJ's best *Wild Trout Streams* due the abundance and occurrence of all three trout species (brook, brown, and rainbow). It was the first stream to have special fishing regulations for wild trout, beginning in the 1979 as a *Natural Trout Fishing Area*, and later designated as a *Wild Trout Stream* when this regulation was implemented in 1990 (and trout stocking completely ceased). This stream has been sampled numerous times since 1968. The trout species distribution pattern found in the 2015 surveys mimicked those observed in the past, where Brook Trout dominate the headwaters, then transitions to Rainbow Trout, and finally to Brown Trout. The Brook Trout and Brown Trout populations in Van Campens Brook are separated by several barriers. Some of these barriers are natural (i.e. waterfalls) and some are old dams that only partially block movement depending on flow conditions. These barriers may be benefiting the Brook Trout population as Brown Trout can have a detrimental effect on Brook Trout populations where the two are found together. In many cases, Brown Trout completely out-compete Brook Trout for resources and Brook Trout can be lost from the stream completely. The following summarizes data collected at the third most downstream location of the four locations surveyed in 2015. This location is found below all known barriers to fish movement.

In this 2015 survey, conducted in Van Campens Glen, 28 wild Brown Trout, 0 wild Brook Trout and 0 wild Rainbow Trout were found. Regulations on Brown Trout differ from other trout species in Van Campens. To keep a Brown Trout caught in Van Campens it has to be 12 inches or greater. This increased size limit is used to increase the size of the Brown Trout found in the stream. The size restriction on Van Campens Brook seems to be working as several large Brown Trout were collected at this site. The largest Brown Trout collected was over 19 inches while 8 others were over 9 inches. Two hundred and one individual fish representing 13 different species were collected at this site.

Recommendation: This 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.

Van Campens Brook

Date: 07/24/2015
County: Warren
Township: Hardwick Twp.
Drainage: Delaware River (1)
Project: Wild Trout Stream Assessment
Location: **Depew Recreation Site, Delaware Water Gap**

Water Chemistry / Habitat

Water Temperature (C):	17.3
Dissolved Oxygen (mg/L):	9.93
Specific Conductance (uS/cm):	79.2
pH:	7.84
Alkalinity (mg/L):	28
Sample Length (m):	150
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Bass, Smallmouth	1	54 - 54
Bullhead, Yellow	1	157 - 157
Chub, Creek	8	0 - 0
Dace, Blacknose	81	0 - 0
Dace, Longnose	6	0 - 0
Eel, American	37	0 - 0
Fallfish	9	0 - 0
Madtom, Margined	3	0 - 0
Minnow, Cutlip	5	0 - 0
Perch, Yellow	3	54 - 57
Sucker, White	6	0 - 0
Sunfish, Green	1	62 - 62
Trout, Brook	1	126 - 126
Trout, Brown (YOY)	15	58 - 85
Trout, Brown	30	146 - 321

Summary: This stream is located within the Delaware Water Gap National Recreation Area (DEWA) and is considered one of NJ's best *Wild Trout Streams* due the abundance and occurrence of all three trout species (brook, brown, and rainbow). It was the first stream to have special fishing regulations for wild trout, beginning in the 1979 as a *Natural Trout Fishing Area*, and later designated as a *Wild Trout Stream* when this regulation was implemented in 1990 (and trout stocking completely ceased). This stream has been sampled numerous times since 1968. The trout species distribution pattern found in the 2015 surveys mimicked those observed in the past, where Brook Trout dominate the headwaters, then transitions to Rainbow Trout, and finally to Brown Trout. The Brook Trout and Brown Trout populations in Van Campens Brook are separated by several barriers. Some of these barriers are natural (i.e. waterfalls) and some are old dams that only partially block movement depending on flow conditions. These barriers maybe benefiting the Brook Trout population as Brown Trout can have a detrimental effect on Brook Trout populations where the two are found together. In many cases, Brown Trout completely out-compete Brook Trout for resources and Brook Trout can be lost from the stream completely. The following summarizes data collected at the most downstream location of the four locations surveyed in 2015. This location is found below all known barriers to fish movement.

In this 2015 survey, conducted in the Depew Recreation Area, 45 wild Brown Trout, 1 wild Brook Trout and 0 wild Rainbow Trout were found. Regulations on Brown Trout differ from other trout species in Van Campens. To keep a Brown Trout caught in Van Campens it has to be 12 inches or greater. This increased size limit is used to increase the size of the Brown Trout found in the stream. The size restriction on Van Campens Brook seems to be working as several large Brown Trout were collected at this site. The largest Brown Trout collected was over 12 inches while 9 others were over 9 inches. Two hundred and one individual fish representing 15 different species were collected at this site.

Recommendation: This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

West Portal Creek

Date: 08/27/2015
County: Hunterdon
Township: Bethlehem Twp.
Drainage: Musconetcong River
Project: Habitat Restoration
Location: **Asbury-West Portal Road bridge, downstream**

Fish Species	Number	Length (mm)
Chub, Creek	8	0 - 0
Dace, Blacknose	200	0 - 0
Dace, Longnose	21	0 - 0
Darter, Tessellated	4	0 - 0
Eel, American	23	0 - 0
Sculpin, Slimy	6	0 - 0
Shiner, Common	7	0 - 0
Sucker, White	29	0 - 0
Trout, Brown (YOY)	17	89 - 108
Trout, Brown	7	180 - 235

Water Chemistry / Habitat

Water Temperature (C): 15.4
Dissolved Oxygen (mg/L): 11.43
Specific Conductance (uS/cm): 397.2
pH: 8.12
Alkalinity (mg/L): 112.5
Sample Length (m): 150
Habitat Assessment Score: 167 Optimal

Summary: This small *Trout Production* stream flows down off the northwestern side of Musconetcong Mountain and then passes through farmland before entering the Musconetcong River. Brown Trout was the only reproducing trout species documented during the electrofishing survey conducted in 1970. In the 2002 survey a few (6) wild Brook Trout were present compared to 168 wild Brown Trout. Slimy Sculpin, a fish species requiring cold, clean water, were also present. Earlier this year (March, 2015) a private landowner located further downstream restored fish habitat in a portion of the stream flowing through his farmland. Problems related to remnants of hatchery raceways adjacent to the stream (that were used long ago to raise trout) were corrected and in-stream trout habitat was improved by creating favorable pools and riffles. The restored stream reach was surveyed in August (2015) to assess the fishery 24 wild Brown Trout (no Brook Trout) were documented. The lower density of trout can be at least partially related to the use of inexperienced volunteers (netting the fish) and the short-term effects of disturbances related to the restoration. Over time, as the stream channel and substrate stabilizes, the density of trout (and trout biomass) is expected to increase. The lower gradient, and deep pools having a silted substrate, will likely continue to favor Brown Trout over Brook Trout in this downstream reach. The fish population in this reach will continue to be monitored to assess the fishery and determine if changes in species composition and density occur.

Recommendation: The stream should be surveyed in a few years to assess the fishery and to determine if trout abundance and size increases as a result of the habitat enhancement project. In addition, the creek should be surveyed further upstream of the restored reach, to determine if wild Brook Trout have been extirpated.

Surveys in the Passaic Region (Passaic, Hackensack, and Hudson) and Upper Atlantic Region

Bear Swamp Brook

Date: 08/17/2015
County: Bergen
Township: Mahwah Twp.
Drainage: Ramapo River
Project: Wild Trout Stream Assessment
Location: **Bear Swamp Rd, upstream of second bridge**

Fish Species	Number	Length (mm)
Dace, Blacknose	20	0 - 0
Sunfish, Pumpkinseed	1	105 - 105
Trout, Brook (YOY)	18	46 - 73
Trout, Brook	10	116 - 249

Water Chemistry / Habitat

Water Temperature (C): 21.9
Dissolved Oxygen (mg/L): 8.24
Specific Conductance (uS/cm): 37
pH: 7.55
Alkalinity (mg/L): 9.5
Sample Length (m): 150
Habitat Assessment Score: 173 Optimal

Summary: This tributary to the Ramapo River was electrofished on August 17 to assess the wild trout population and its status as a currently regulated *Wild Trout Stream* (WTS). Six surveys were conducted on this tributary in the past (1968, 1971, 2003, 2012, 2013, and 2014) and wild Brook Trout were found in three of them (1968, 2003, and 2014). Surveys conducted closer to the outlet, or above Bear Swamp Lake found no presence of Brook Trout compared to those conducted further downstream of the lake and closer to the confluence with the Ramapo River. The survey that was conducted in 2014 was aimed at providing information that would aide in the development or changes to the WTS regulations, and it was decided that additional data or sampling of this stream in 2015 was needed before a decision was made about current regulations. This year's survey was conducted more upstream from last year's survey on Bear Swamp Brook with the purpose of selecting a site that had larger pools and more habitat in hopes to capture more Brook Trout. This survey did capture more wild Brook Trout than any survey in the past (24 Brook Trout, including 3 young-of-the-year (YOY), captured in 2014 was the second most). Species encountered during this survey included 28 Brook Trout ranging from 46 – 249 mm (2 – 10 in), including 18 YOY. The stream's habitat is composed of many boulders and larger pools where the Brook Trout tend to congregate and survive. In addition, it does seem to be a very popular stretch to fish for anglers as there are abundant trails, access, and public property.

Recommendation: No additional surveys are needed at this time. This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Black Brook (Morris)

Date: 08/14/2015
County: Morris
Township: Long Hill Twp..
Drainage: Passaic River - Upper
Project: Native Species Inventory
Location: **Whitebridge Rd Bridge, downstream, adjacent to raptor trust.**

Fish Species	Number	Length (mm)
Bass, Largemouth	1	68 - 68
Bullhead, Brown	2	0 - 0
Chubsucker, Creek	5	0 - 0
Darter, Tessellated	11	0 - 0
Mudminnow, Eastern	104	0 - 0
Pickerel, Redfin	17	65 - 155
Sunfish, Bluespotted	3	0 - 0
Sunfish, Redbreast	1	138 - 138

Water Chemistry / Habitat

Water Temperature (C): 17.3
Dissolved Oxygen (mg/L): 5.74
Specific Conductance (uS/cm): 353.6
pH: 7.50
Alkalinity (mg/L): 199
Sample Length (m): 150
Habitat Assessment Score: 156 Sub-Optimal (low gradient)

Summary: This tributary to the Passaic River was electrofished on August 14 to assess the native fish population here. This low gradient stream flows through the Great Swamp National Wildlife Refuge and was selected as a site that may potentially hold more rare native species, such as, Banded Sunfish or Bridle Shiner, and documentation of their distribution is important to assess their status in New Jersey. The last two surveys conducted on Black Brook were in 1969 and 1980 and the taxa found were of a variety of fish that would be deemed ubiquitous in New Jersey. For the survey conducted this year a new site, located more downstream, was selected. Species encountered during this survey included some that have not been documented in Black Brook yet, such as, Bluespotted Sunfish, Redbreast Sunfish, Creek Chubsucker, and Tessellated Darter. The Bluespotted Sunfish, a native species with statewide distribution, is being evaluated to determine if its state status, with preliminary indications that Secure/Stable status may be warranted, however these data have value in regards to mapping their current distribution.

Recommendation: Collaborate with Great Swamp National Wildlife Refuge to collect or share data about presence or absence of fish species throughout the refuge.

Hibernia Brook (trib.) (Lake Ames)

Date: 07/21/2015
County: Morris
Township: Rockaway Twp.
Drainage: Rockaway River
Project: Wild Trout Stream Assessment
Location: **Snake Hill Rd Bridge, upstream**

Fish Species	Number	Length (mm)
Bass, Largemouth	6	46 - 64
Dace, Blacknose	109	0 - 0
Mudminnow, Eastern	1	0 - 0
Perch, Yellow	7	34 - 49
Pickerel, Chain	1	110 - 110
Sculpin, Slimy	76	0 - 0
Sucker, White	4	0 - 0
Trout, Brook (YOY)	62	45 - 80
Trout, Brook	6	110 - 168

Water Chemistry / Habitat

Water Temperature (C): 21.6
Dissolved Oxygen (mg/L): 7.94
Specific Conductance (uS/cm): 219.4
pH: 7.97
Alkalinity (mg/L): 43.5
Sample Length (m): 150
Habitat Assessment Score: 159 Sub-Optimal

Summary: This tributary to the Rockaway River was electrofished on July 21 to assess the wild trout population. A survey conducted in 2007 indicated an abundant population of Brook Trout with 53 of the 125 total Brook Trout captured being young-of-the-year (YOY). However, prior to the 2007 survey, 3 surveys were conducted in the 1980's and only captured 19 (1985), 22 (1983), and 3 (1982) Brook Trout respectively. Species encountered in this survey included 67 Brook Trout ranging from 45 – 168 mm (1.8 – 6.6 in), including 61 YOY. The population seems to be dominated by YOY. It is difficult to assess what the reasons are for differences in population abundance from survey to survey as locations of surveys vary or are unknown. This stream currently does not have special trout fishing regulations (statewide general trout regulations apply). In addition, the Slimy Sculpin was found in abundance during this survey and is considered an excellent indicator of water quality, is being evaluated in NJ to determine its state status, with preliminary indications that Threatened status may be warranted.

Recommendation: Scout in the summer time to determine presence of larger pools and habitat needed to hold larger Brook Trout further upstream. This 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.

Indian Grove Brook

Date: 08/03/2015
County: Somerset
Township: Bernardsville Boro
Drainage: Passaic River - Upper
Project: Wild Trout Stream Assessment
Location: **Hardscrabble Road, downstream of bridge**

Fish Species	Number	Length (mm)
Bass, Largemouth	1	60 - 60
Chub, Creek	88	0 - 0
Dace, Blacknose	277	0 - 0
Sucker, White	9	0 - 0
Trout, Rainbow (YOY)	24	41 - 57
Trout, Rainbow	5	136 - 197

Water Chemistry / Habitat

Water Temperature (C): 20.8
Dissolved Oxygen (mg/L): 8.89
Specific Conductance (uS/cm): 296.2
pH: 7.58
Alkalinity (mg/L): 40
Sample Length (m): 150
Habitat Assessment Score: 154 Sub-Optimal

Summary: This tributary to the Passaic River was electrofished on August 3 to assess the wild trout population and its status as a currently designated *Wild Trout Stream* (WTS). Indian Grove Brook is an interesting stream as it is one of the few in the state of New Jersey with a wild Rainbow Trout population. This survey is the second conducted here in two years and it was decided that additional data was needed before a decision was made about current regulations. In 1990, 1996, and 2007, surveys were conducted on Indian Grove Brook. Fifty Rainbow Trout were encountered both in 1990 and 1996 and 150 Rainbow Trout were encountered in 2007. A survey conducted in 2014 indicated that the wild Rainbow Trout population had declined from previous surveys conducted here (only 24 Rainbow Trout captured, including 2 young-of-the-year (YOY)). Species encountered in this survey included 29 Rainbow Trout ranging from 41 – 197 mm (1.6 – 7.8 in), including 24 YOY. Rainbow Trout numbers are still low and species composition or assemblage has not changed significantly. Positive to note is the great access located at this site, as it flows through Morristown National Historical Park (Jockey Hollow) and into property owned by the Audobon where is enters the Passaic River. Both areas have trails and parking accessible for those wishing to fish Indian Grove Brook. This stream will be closely monitored and information gathered here will be used to assess potential regulation changes for the WTS assessment.

Recommendation: No additional surveys are needed at this time. This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Mill Brook (Morris)

Date: 08/03/2015
County: Morris
Township: Randolph Twp.
Drainage: Rockaway River
Project: Wild Trout Stream Assessment
Location: **Fords Road, midpoint adjacent to pull off across from 28 Fords Road.**

Fish Species	Number	Length (mm)
Chub, Creek	14	0 - 0
Dace, Blacknose	47	0 - 0
Sucker, White	24	0 - 0
Trout, Brown (YOY)	73	47 - 88
Trout, Brown	64	118 - 271

Water Chemistry / Habitat

Water Temperature (C): 19.6
Dissolved Oxygen (mg/L): 7.86
Specific Conductance (uS/cm):
pH: 7.17
Alkalinity (mg/L): 23.5
Sample Length (m): 150
Habitat Assessment Score: 160 Optimal

Summary: This tributary to the Rockaway River was electrofished on August 3 to assess the wild trout population and be considered as a potential site to designate as a *Wild Trout Stream* (WTS). Historically, until 2013, Mill Brook was stocked with trout, but recent surveys conducted by the Bureau of Freshwater Fisheries found an abundance of wild Brown Trout and it was determined that stocking was not necessary. A survey conducted in 2013 indicated an abundant Brown Trout population (138 captured, including 51 young-of-the-year (YOY)). Species encountered in this survey included 137 Brown Trout ranging from 47 – 271 mm (1.8 - 10.6 in), including 73 YOY. This is the fourth survey conducted here since 2012 to assess the wild trout population. This stream currently does not have special trout fishing regulations (statewide general trout regulations apply), but it may be a good candidate for a WTS regulation.

Recommendation: No additional surveys are necessary at this time. This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Passaic River

Date: 08/14/2015
County: Somerset
Township: Bernardsville Boro
Drainage: Passaic River - Upper
Project: Wild Trout Stream Assessment
Location: **Upstream of confluence with Indian Grove Brook**

Water Chemistry / Habitat

Water Temperature (C):	17.7
Dissolved Oxygen (mg/L):	9.41
Specific Conductance (uS/cm):	257.2
pH:	7.82
Alkalinity (mg/L):	52
Sample Length (m):	150
Habitat Assessment Score:	178 Optimal

Fish Species	Number	Length (mm)
Chub, Creek	4	0 - 0
Dace, Blacknose	68	0 - 0
Dace, Longnose	37	0 - 0
Darter, Tessellated	16	0 - 0
Sucker, White	5	0 - 0
Trout, Brown (YOY)	24	50 - 87
Trout, Brown	8	150 - 257
Trout, Rainbow (YOY)	19	37 - 87
Trout, Rainbow	12	131 - 253

Summary: On August 14 an electrofishing survey was conducted on Passaic River within the Scherman Hoffman Audubon property to assess the wild trout population and its status as a currently designated *Wild Trout Stream* (WTS). Since 2007, six surveys have been conducted on the upper Passaic River within the WTS regulation area. Wild Rainbow Trout and Brown Trout have been found throughout. The survey conducted this year unveiled 31 wild Rainbow Trout, 37 – 253 mm (1.5 – 10.0 in), including 19 young-of-the-year (YOY), and 32 wild Brown Trout, including 24 YOY. More trout were captured in this survey than in the 2014 survey (which captured 13 Brown Trout and 8 Rainbow Trout) that was conducted approximately 1.5 miles upstream. In conversations with the director and other employees working with the Audubon, many have indicated this section's popularity to anglers and have seen many larger wild trout upstream of where we conducted surveys. These surveys conducted here will aid in development of new WTS regulations.

Recommendation: No additional surveys are necessary at this time. This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Pequannock River (trib.) (Copperas Mountain)

Date: 08/17/2015
County: Morris
Township: Rockaway Twp.
Drainage: Pequannock River
Project: Wild Trout Stream Assessment
Location: **Green Pond Rd. upstream of bridge**

Fish Species	Number	Length (mm)
Mudminnow, Eastern	1	0 - 0
Sculpin, Slimy	80	0 - 0
Trout, Brook (YOY)	72	52 - 100
Trout, Brook	42	108 - 215
Trout, Brown (YOY)	4	41 - 63
Trout, Brown	2	137 - 230

Water Chemistry / Habitat

Water Temperature (C): 16.4
Dissolved Oxygen (mg/L): 9.83
Specific Conductance (uS/cm): 376.8
pH: 8.11
Alkalinity (mg/L): 96
Sample Length (m): 150
Habitat Assessment Score: 189 Optimal

Summary: This tributary to the Pequannock River was electrofished on August 17 to assess the wild trout population and be considered as a potential site to designate as a *Wild Trout Stream* (WTS). Surveys conducted in 2001 and 2010 documented healthy wild populations of Brown Trout and Brook Trout. The status of Brook Trout, is being evaluated in NJ, with preliminary indications that Special Concern status may be warranted. Species encountered during this survey included 6 Brown Trout ranging from 41 – 230 mm (1.6 – 9 in), including 4 young-of-the-year (YOY), and 114 Brook Trout ranging from 52 – 215 mm (2 – 8.5 in), including 72 YOY. All surveys conducted here have indicated an abundant population of wild trout but access to this stream is very difficult. Downstream of the survey location, past Green Pond Road there is private property and fencing blocking access. Upstream of Green Pond Road, terrestrial plant growth is heavy which makes any fishing or access difficult and discouraging. This stream currently does not have special trout fishing regulations (statewide general trout regulations apply), but it may be a good candidate for a WTS regulation. In addition, Slimy Sculpin, were found in abundance. The Slimy Sculpin, considered an excellent indicator of water quality, is being evaluated in NJ to determine its state status, with preliminary indications that Threatened status may be warranted.

Recommendation: No additional surveys are necessary at this time. Enough information has been collected for this stream to make a determination as to the status of its inclusion/exclusion in possible wild trout regulation developments. This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Primrose Brook

Date: 07/22/2015
County: Morris
Township: Harding Twp.
Drainage: Passaic River - Upper
Project: Wild Trout Stream Assessment
Location: **Grand Loop Trail, Morristown National Historical Park (Jockey Hollow)**

Fish Species	Number	Length (mm)
Chub, Creek	35	0 - 0
Dace, Blacknose	69	0 - 0
Sculpin, Slimy	222	0 - 0
Trout, Brook (YOY)	43	48 - 85
Trout, Brook	65	94 - 200

Water Chemistry / Habitat

Water Temperature (C): 17.7
Dissolved Oxygen (mg/L): 9.3
Specific Conductance (uS/cm): 122.3
pH: 7.86
Alkalinity (mg/L): 38
Sample Length (m): 150
Habitat Assessment Score: 166 Optimal

Summary: This tributary to the Passaic River was electrofished on July 22 inside the Morristown National Historical Park to assess the wild trout population. A survey conducted in 1992 on Primrose Brook was upstream of the site selected this year and both wild Brook Trout (23) and wild Brown Trout (12) were found. The status of Brook Trout is being evaluated in NJ, with preliminary indications that Special Concern status may be warranted. Species encountered in this survey included 109 Brook Trout ranging from 48 – 200 mm (1.9 – 7.9 in), including 43 young-of-the-year (YOY). Brown Trout were no longer present after showing up in the 1992 survey and Brook Trout are now more abundant. This section of stream is located within the Morristown National Park and has multiple foot trails that lead to different areas of the stream. This stream currently does not have special trout fishing regulations (statewide general trout regulations apply), but it may be a good candidate for a *Wild Trout Stream* regulation. In addition, Slimy Sculpin, were found in abundance. The Slimy Sculpin, considered an excellent indicator of water quality, is being evaluated in NJ to determine its state status, with preliminary indications that Threatened status may be warranted.

Recommendation: No additional surveys are necessary at this time. This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Rockaway River (trib.) (W. Longwood Lake)

Date: 07/21/2015
County: Morris
Township: Jefferson Twp.
Drainage: Rockaway River
Project: Wild Trout Stream Assessment
Location: **Paderewski Rd**

Fish Species	Number	Length (mm)
NO FISH FOUND	0	0 - 0

Water Chemistry / Habitat

Water Temperature (C):	20.2
Dissolved Oxygen (mg/L):	8.12
Specific Conductance (uS/cm):	31.5
pH:	7.54
Alkalinity (mg/L):	12
Sample Length (m):	150
Habitat Assessment Score:	N/A

Summary: This tributary to the Rockaway River was electrofished on July 21 to assess the wild trout population. A survey conducted in 2009 indicated a moderately abundant population of Brook Trout with 13 of the 34 total Brook Trout captured being young-of-the-year (YOY). The sample site chosen for this survey was less than 0.5 miles upstream from the survey in 2009 and was on public property making it easily accessible to anglers. However, no fish were found.

Recommendation: Investigate downstream to see if a natural barrier is stopping any migration and colonization in this area, or if an event occurred that extirpated fish from this stream.

Surveys in the Raritan Region
(Raritan, Arthur Kill, Raritan Bay, Shrewsbury, and Navesink)

Beaver Brook (Hunterdon)

Date: 08/28/2015
County: Hunterdon
Township: Clinton Town
Drainage: Raritan River - South Branch
Project: Wild Trout Stream Assessment
Location: **Old Highway 22, upstream of municipal building on Leigh St.**

Water Chemistry / Habitat

Water Temperature (C):	17
Dissolved Oxygen (mg/L):	9.9
Specific Conductance (uS/cm):	686
pH:	7.94
Alkalinity (mg/L):	122
Sample Length (m):	150
Habitat Assessment Score:	116 Sub-Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	9	68 - 141
Bass, Smallmouth	1	103 - 103
Chub, Creek	31	0 - 0
Dace, Blacknose	50	0 - 0
Dace, Longnose	16	0 - 0
Darter, Tessellated	63	0 - 0
Eel, American	19	0 - 0
Sucker, White	34	0 - 0
Sunfish, Pumpkinseed	1	115 - 115
Sunfish, Redbreast	3	77 - 134
Trout, Brown (YOY)	4	75 - 86
Trout, Brown	21	156 - 318
Trout, Rainbow	4	287 - 305

Summary: Despite the close proximity of a suite of human impacts within the Town of Clinton, consisting of many roads, parking lots, and buildings, Beaver Brook is a trout-stocked water that has reproducing Brown Trout. This was confirmed when electrofished on August 28, as 25 wild Brown Trout and 4 stocked Rainbow Trout were captured in a 150 meter sampling reach. Five of Brown Trout were over 229 mm (9 in), which may indicate a desirable fishery, however concern is warranted for the sustainability of Brown Trout in Beaver Brook, because only four young-of-the-year (YOY) were found. Although water temperature was adequate at the time of survey (17.0 C / 62.6 F), other water quality measurements such as Specific Conductance (686.0 uS/cm) were elevated. Flows were also reduced during the time of the survey, which may have stressed the trout population. A survey was conducted during the summer of 2012, nearly five miles upstream from this location. At that time, 25 YOY and 24 older than YOY were encountered, five of which exceeded 9 inches. The most recent survey in close proximity occurred in 2001, in which 40 YOY and 7 older fish were collected, however none were over 9 inches.

Recommendation: These data will be assessed as part of the *Wild Trout Stream* regulation assessment. In addition, anecdotal information indicates angling participation on this trout stocked water may have declined, therefore it is recommended to conduct angler counts during the spring of 2016 to help determine if Beaver Brook should remain in the Division's trout stocking program. This survey was conducted within the lower end (Beaver Brook (Clinton)) as defined as "Lower most I-78 bridge downstream to the S/Br. Raritan River" is currently classified as *Trout Maintenance*. The presence of 4 YOY Brown Trout (in addition to the 2001 data) suggests the Division may recommend to New Jersey's Surface Water Quality Standards, N.J.A.C. 7:9B to extend the *Trout Production* boundary to include this stream segment. No additional surveys are necessary at this time.

Beden Brook

Date: 09/03/2015
County: Mercer
Township: Hopewell Twp.-Mercer Co.
Drainage: Millstone River
Project: Native Species Inventory
Location: **Aunt Molly Road bridge, downstream**

Water Chemistry / Habitat

Water Temperature (C):	24.2
Dissolved Oxygen (mg/L):	7.67
Specific Conductance (uS/cm):	621
pH:	8.04
Alkalinity (mg/L):	96
Sample Length (m):	150
Habitat Assessment Score:	147 Sub-Optimal

Fish Species	Number	Length (mm)
Chub, Creek	96	0 - 0
Dace, Blacknose	468	0 - 0
Darter, Tessellated	144	0 - 0
Eel, American	47	0 - 0
Killifish, Banded	39	0 - 0
Shiner, Bridle	1	0 - 0
Shiner, Common	125	0 - 0
Shiner, Satinfin	9	0 - 0
Shiner, Spottail	20	0 - 0
Sucker, White	89	0 - 0
Sunfish, Bluegill	1	73 - 73
Sunfish, Redbreast	22	29 - 139
Unknown Gambusia spp.	1	0 - 0

Summary: When last surveyed in 2003, twenty-five Bridle Shiners were collected at this site on Beden Brook. Bridle Shiners are one of the most rare freshwater fish species in NJ and are decreasing throughout their native range. As a result, they are likely to be listed as a Threatened or Endangered species in the near future. An electrofishing survey was conducted this summer to determine if this population is still present and only one Bridle Shiner was found. When last surveyed, the fish assemblage was composed of 15 native species and only one non-native, represented by only 1 Largemouth Bass. During this survey, only 11 native species were found and the only non-native species encountered were 1 Bluegill and 1 Mosquitofish sp. Although no Largemouth Bass were found during the standardized 150m survey, approximately five in the 8-12 inch size range were observed immediately upstream of the bridge, which was outside of the survey area. This location produced 1,062 individual fish, which was dominated by Blacknose Dace, Tessellated Darters, and Common Shiners. One solitary Bridle Shiner was found, which means that they are still holding on, but faced with a significant decline. The 4 native species not represented during the 2015 survey include Swallowtail Shiner, Redfin Pickerel, Creek Chubsucker, and Pumpkinseed Sunfish.

Recommendation: It is recommended to monitor this Bridle Shiner population. Additional surveys in the watershed are necessary to determine the current status and distribution of Bridle Shiners.

Beden Brook

Date: 09/02/2015
County: Somerset
Township: Montgomery Twp.
Drainage: Millstone River
Project: Native Species Inventory
Location: **Cherry Hill Road bridge, upstream**

Water Chemistry / Habitat

Water Temperature (C):	22.7
Dissolved Oxygen (mg/L):	5.39
Specific Conductance (uS/cm):	450.2
pH:	7.71
Alkalinity (mg/L):	83
Sample Length (m):	150
Habitat Assessment Score:	94 Marginal (low gradient)

Fish Species	Number	Length (mm)
Bass, Largemouth	7	61 - 119
Bass, Smallmouth	1	196 - 196
Bullhead, Yellow	2	57 - 123
Chub, Creek	5	0 - 0
Dace, Longnose	5	0 - 0
Darter, Tessellated	29	0 - 0
Eel, American	42	0 - 0
Killifish, Banded	36	0 - 0
Shiner, Common	49	0 - 0
Shiner, Satinfin	3	0 - 0
Shiner, Spottail	2	0 - 0
Shiner, Swallowtail	16	0 - 0
Sucker, White	80	0 - 0
Sunfish, Redbreast	1	103 - 103

Summary: A survey was conducted on Beden Brook to search for Bridle Shiners. The Bridle Shiner, one of the state's most rare species, is being evaluated in NJ to determine its state status, with preliminary indications that Endangered status may be warranted. This location is downstream of a known Bridle Shiner site on Beden Brook in which they were encountered in 2003 and again in 2015. The water level was very low on the day in which the survey was conducted, with large amounts of bedrock and streambed exposed. It was anticipated that if any Bridle Shiners were present, they may have been easier to find, as they may have been consolidated into the few remaining deeper pools, however no Bridle Shiners were found. In fact, any Bridle Shiners that may have been present would likely find it difficult to persist in the presence of the Largemouth and Smallmouth Bass that were found inhabiting the same pools. Bridle Shiners are not typically found in streams with substantial populations of non-native bass and sunfish. A lack of aquatic vegetation and available cover was an indication that this survey was not ideal habitat. Sixteen Swallowtail Shiners were found, which are often present in streams inhabited by Bridle Shiners, however they appear to be more tolerant to stressors and therefore more widespread.

Recommendation: Additional surveys in the watershed are necessary to determine the current status and distribution of Bridle Shiners.

Beden Brook (trib) (Rocky Hill)

Date: 09/02/2015
County: Somerset
Township: Montgomery Twp.
Drainage: Millstone River
Project: Native Species Inventory
Location: **Southern Hills Drive bridge, downstream**

Fish Species	Number	Length (mm)
Bass, Largemouth	2	66 - 98
Bullhead, Brown	13	37 - 70
Chub, Creek	98	0 - 0
Dace, Blacknose	32	0 - 0
Darter, Tessellated	36	0 - 0
Eel, American	2	0 - 0
Sucker, White	72	0 - 0
Sunfish, Bluegill	4	49 - 58
Sunfish, Pumpkinseed	24	42 - 108

Water Chemistry / Habitat

Water Temperature (C): 23.2
Dissolved Oxygen (mg/L): 9.06
Specific Conductance (uS/cm): 386.3
pH: 7.77
Alkalinity (mg/L): 62
Sample Length (m): 150
Habitat Assessment Score: 158 Sub-Optimal

Summary: This tributary to Beden Brook was surveyed because it is approximately 2 miles downstream from a confirmed Bridle Shiner location, however none were found at this location. The Bridle Shiner, one of the state's most rare species, is being evaluated in NJ to determine its state status, with preliminary indications that Endangered status may be warranted. This stream is located within a relatively new and well-planned housing development, as large vegetated riparian buffer widths were left intact. Seven native species were found and two non-natives (Largemouth Bass and Bluegill). Native minnow diversity (especially rare minnows such as Bridle, Ironcolor, and Comely Shiners) is typically decreased in streams inhabited by non-native species such as Largemouth Bass and various non-native sunfish. The impacts of several impoundments along this stream, in addition to the presence of agriculture, a golf course, a housing development, a lack of aquatic vegetation, and presence of non-native predators make it unlikely for Bridle Shiners to survive in this tributary.

Recommendation: Additional surveys in the watershed are necessary to determine the current status and distribution of Bridle Shiners.

Black Brook (Hunterdon)

Date: 07/07/2015
County: Hunterdon
Township: Union Twp.-Hunterdon Co.
Drainage: Raritan River - South Branch
Project: Temperature Study - TP Streams
Location: **Van Syckels Road, upstream**

Fish Species	Number	Length (mm)
Chub, Creek	7	0 - 0
Dace, Blacknose	71	0 - 0
Dace, Longnose	9	0 - 0
Darter, Tessellated	2	0 - 0
Sucker, White	1	0 - 0
Sunfish, Pumpkinseed	2	91 - 91
Trout, Brown (YOY)	8	66 - 76
Trout, Brown	3	155 - 198

Water Chemistry / Habitat

Water Temperature (C): 20.3
Dissolved Oxygen (mg/L): 9.81
Specific Conductance (uS/cm): 148.1
pH: 7.75
Alkalinity (mg/L): 25
Sample Length (m): 150
Habitat Assessment Score: 145 Sub-Optimal

Summary: This tributary to the South Branch of the Raritan River was electrofished on July 7 to address two project needs: (1) to assess the wild trout population structure relative to the stream temperature regime and (2) to assess the wild trout population and its status as a currently regulated *Wild Trout Stream* (WTS). A survey conducted here last year captured 13 wild Brown Trout. Species encountered in this survey included 11 wild Brown Trout ranging from 66 – 198 mm (2.6 – 7.8 in), including 8 young-of-the-year (YOY). This wild trout population continues to decline. The population here has been relatively isolated since the creation of the Spruce Run dam in 1964 that created a large reservoir where multiple wild trout tributaries historically flowed into Spruce Run. This isolation and low population abundance is a concern for the persistence of trout here. When the tributary was originally sampled in 1969 and then in 1976, Brook Trout and Rainbow Trout were found. In 2003, it was first documented that Brown Trout were present in the tributary and may be the reason Brook Trout have not been found since. The Rainbow Trout that were captured in 1969, 1976, and 2003 were most likely from stocking that was done in Spruce Run Reservoir that has been discontinued since 2005. In addition, not more than 32 trout (in 1969) have been captured in any survey (total of 5 surveys).

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 14 *Wild Trout Streams*. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams. In addition, this 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Hickory Run

Date: 07/09/2015
County: Hunterdon
Township: Lebanon Twp.
Drainage: Raritan River - South Branch
Project: Temperature Study - TP Streams
Location: **Hickory Run Road**

Fish Species	Number	Length (mm)
Chub, Creek	4	0 - 0
Dace, Blacknose	11	0 - 0
Sunfish, Redbreast	1	84 - 84
Trout, Brook (YOY)	124	39 - 77
Trout, Brook	74	98 - 205

Water Chemistry / Habitat

Water Temperature (C): 18.3
Dissolved Oxygen (mg/L): 8.86
Specific Conductance (uS/cm): 152
pH: 7.48
Alkalinity (mg/L): 28
Sample Length (m): 150
Habitat Assessment Score: 183 Optimal

Summary: This tributary to the South Branch of the Raritan River was electrofished on July 9 to address two project needs: (1) to assess the wild trout population structure relative to the stream temperature regime and (2) to assess the wild trout population and its status as a currently regulated *Wild Trout Stream* (WTS). A survey conducted in 1969, upstream of Hickory Farm Dairy, found a wild Rainbow Trout population but the last survey to document wild Rainbow Trout in this location was in 2003. Furthermore, wild Brook Trout were not documented here until 2003. Rainbow Trout were historically stocked in the farm pond located on the stream but this has been discontinued. It could be the stocking of Rainbow Trout was supplementing the naturally reproducing population but then declined and has been replaced by Brook Trout that were able to more successfully occupy this stream. In a survey conducted last year, 255 wild Brook Trout were captured, including 34 young-of-the-year (YOY). Species encountered in this survey included 198 wild Brook Trout ranging from 39 – 205 mm (1.5 – 8.1 in), including 124 YOY. The population now seems to be stable.

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 14 *Wild Trout Streams*. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams. In addition, this 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

India Brook

Date: 08/26/2015
County: Morris
Township: Mendham Boro
Drainage: Raritan River - North Branch
Project: Wild Trout Stream Assessment
Location: **Mountainside Road bridge, downstream**

Fish Species	Number	Length (mm)
Dace, Blacknose	21	0 - 0
Dace, Longnose	64	0 - 0
Darter, Tessellated	9	0 - 0
Sunfish, Bluegill	1	86 - 86
Sunfish, Pumpkinseed	3	57 - 71
Trout, Brown (YOY)	42	50 - 91
Trout, Brown	33	124 - 230
Trout, Rainbow	2	276 - 278

Water Chemistry / Habitat

Water Temperature (C): 18.8
Dissolved Oxygen (mg/L): 8.66
Specific Conductance (uS/cm): 288
pH: 7.83
Alkalinity (mg/L): 45
Sample Length (m): 150
Habitat Assessment Score: 151 Sub-Optimal

Summary: India Brook is managed as a *Wild Trout Stream* from its source, downstream to the Mountainside Road bridge and it is managed under the general trout regulations and is stocked with trout from this bridge downstream to its confluence with the North Branch of the Raritan River. Two surveys were conducted in the *Wild Trout Stream* section during 2014. The uppermost survey conducted in 2014 produced a mix of wild Brown (54) and Brook Trout (12), while the site farther downstream produced 155 wild Brown and 34 young-of-the-year (YOY) Rainbow Trout from 37 – 77 mm (1.5 - 2.9 in). No additional year classes of Rainbow Trout were encountered, therefore the stability of this population is in question. Data collection for the *Wild Trout Stream* assessment along India Brook was expanded in 2015, to include a third site, located downstream of the section regulated as a *Wild Trout Stream*. During 2015, 75 wild Brown Trout up to nine inches and 2 stocked Rainbow Trout were found. Brook Trout have not been found in the middle and lower sections of India Brook in recent years.

Recommendation: This 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*). Additional monitoring of this stream will also be beneficial as it appears the Brook Trout may disappear over time and it will be interesting to assess the stability of Rainbow Trout. Continuation of trout stocking in the lower portion of this stream will be discussed, as the Wild Trout Stream regulations are assessed.

Lamington (Black) River

Date: 08/05/2015
County: Morris
Township: Chester Twp.
Drainage: Raritan River - North Branch
Project: General Fisheries Survey
Location: **State Park Road, endpoint at Kay's Pond Dam**

Fish Species	Number	Length (mm)
Bass, Largemouth	9	58 - 122
Bullhead, Brown	1	262 - 262
Bullhead, Yellow	1	146 - 146
Pickerel, Chain	2	102 - 235
Pickerel, Redfin	1	200 - 200
Sunfish, Bluegill	3	110 - 123
Sunfish, Green	6	82 - 124
Sunfish, Pumpkinseed	4	103 - 127
Sunfish, Redbreast	104	50 - 262
Trout, Rainbow	1	287 - 287

Water Chemistry / Habitat

Water Temperature (C):	20.9
Dissolved Oxygen (mg/L):	7.59
Specific Conductance (uS/cm):	45.7
pH:	7.75
Alkalinity (mg/L):	70
Sample Length (m):	150
Habitat Assessment Score:	151 Sub-Optimal

Summary: The Lamington (Black) River is one of NJ's most popular Trout Stocked Waters and therefore is one of sixteen that is closed to fishing from 5am to 5pm on days in which it is stocked during the Spring. Continuous stream temperature loggers were installed to monitor all sixteen of these waters. Two electrofishing surveys were conducted in the Lamington (Black) River within Hacklebarney State Park and within Black River County Park near the Kay Environmental Center, to assess the current fish populations in relation to the water temperature data that are being collected. Fish surveys were also collected at these locations in 2014 (The survey location near the Kay Environmental Center was shifted upstream slightly, immediately downstream of Kay's Pond). Both sections are classified as *Trout Maintenance* NJ's Surface Water Quality Standards N.J.A.C. 7:9B. Previous surveys have indicated the trout supporting capabilities of both stocked and wild trout, however no reproduction has been found in this section of the river. In 2014 the survey within Black River County Park unveiled three wild Brook Trout from 162 mm to 218 mm (6.4 – 8.6 in). No young-of-the-year (YOY) trout were encountered, therefore the Incidence of Occurrence value was calculated to be 31.8, confirming the *Trout* Maintenance classification. In 2015 only one stocked Rainbow Trout was found and the Incidence of Occurrence also decreased to 17.0 (*Non-Trout*).

Recommendation: This survey was conducted in the same location, or close to, a continuous stream temperature monitoring station that the Bureau of Freshwater Fisheries currently has 38 of located throughout the State of New Jersey. This survey will aide in understanding fish absence or presence based on specific temperature regimes and will continue to be conducted for the next 2-3 years in this same location. It will be interesting to assess the continuous water temperature data as one would expect more trout to be found, given the excellent habitat in this section of river and proximity of several *Trout Production* streams, including Hacklebarney Brook.

Lamington (Black) River

Date: 08/05/2015
County: Morris
Township: Washington Twp.-Morris Co.
Drainage: Raritan River - North Branch
Project: General Fisheries Survey
Location: **Hacklebarney State Park, between Trout Bk and Rinehart Bk**

Water Chemistry / Habitat

Water Temperature (C):	20.8
Dissolved Oxygen (mg/L):	8.93
Specific Conductance (uS/cm):	378.9
pH:	8.25
Alkalinity (mg/L):	61
Sample Length (m):	150
Habitat Assessment Score:	178 Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	3	62 - 90
Bullhead, Brown	1	172 - 172
Bullhead, Yellow	1	197 - 197
Pickerel, Chain	1	146 - 146
Sunfish, Bluegill	3	66 - 98
Sunfish, Pumpkinseed	4	74 - 92
Sunfish, Redbreast	3	119 - 123
Trout, Brook	1	178 - 178
Trout, Brown (YOY)	6	61 - 75
Trout, Brown	6	164 - 282
Trout, Rainbow	13	134 - 427

Summary: The Lamington (Black) River is one of NJ's most popular Trout Stocked Waters and therefore is one of sixteen that is closed to fishing from 5am to 5pm on days in which it is stocked during the Spring. Continuous stream temperature loggers were installed to monitor all sixteen of these waters. Two electrofishing surveys were conducted in the Lamington (Black) River within Hacklebarney State Park and within Black River County Park near the Kay Environmental Center, to assess the current fish populations in relation to the water temperature data that is being collected. Fish surveys were also collected at these locations in 2014 (The survey location near the Kay Environmental Center was shifted upstream slightly, immediately downstream of Kay's Pond). Both sections are classified as *Trout Maintenance* NJ's Surface Water Quality Standards N.J.A.C. 7:9B. Previous surveys have indicated the trout supporting capabilities of both stocked and wild trout, however no reproduction has been found in this section of the river. The 2015 survey within Hacklebarney State Park yielded much better results than in 2014. In 2014, 8 trout were encountered (1 stocked Rainbow, 1 stocked Brook and 6 wild Browns, with 0 young-of-the-year), while 26 were found in 2015. This year, 13 Rainbow Trout were collected, including 6 stocked fish as indicated by severe fin erosion and size (226 – 427 mm) and 7 ranging from 134 – 182 mm that were presume to be of wild origin at the time, however with further inquiry, they could have been fish that were released from the Division'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 were found.

Recommendation: This survey was conducted in the same location, or close to, a continuous stream temperature monitoring station that the Bureau of Freshwater Fisheries currently has 38 of located throughout the State of New Jersey. This survey will aide in understanding fish absence or presence based on specific temperature regimes and will continue to be conducted for the next 2-3 years in this same location. It will be interesting to assess the continuous water temperature data as one would expect more trout to be found, given the excellent habitat in this section of river and proximity of several *Trout Production* streams, including Trout Brook and Rinehart Brook. The presence of YOY Brown Trout may warrant consideration to upgrade this stretch of the Lamington (Black) River to *Trout Production*.

Mulhockaway Creek

Date: 08/12/2015
County: Hunterdon
Township: Union Twp.-Hunterdon Co.
Drainage: Raritan River - South Branch
Project: Wild Trout Stream Assessment
Location: **Norton Rd.-Charlestown Rd. Bridge upstream**

Water Chemistry / Habitat

Water Temperature (C):	18.6
Dissolved Oxygen (mg/L):	8.39
Specific Conductance (uS/cm):	585
pH:	7.79
Alkalinity (mg/L):	71.5
Sample Length (m):	150
Habitat Assessment Score:	171 Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	22	51 - 86
Bass, Smallmouth	5	54 - 96
Bullhead, Brown	1	153 - 153
Bullhead, Yellow	1	168 - 168
Chub, Creek	7	0 - 0
Dace, Blacknose	72	0 - 0
Dace, Longnose	20	0 - 0
Darter, Tessellated	38	0 - 0
Eel, American	8	0 - 0
Perch, Yellow	3	137 - 168
Pickerel, Redfin	1	92 - 92
Shiner, Spotfin	1	0 - 0
Shiner, Spottail	1	0 - 0
Sucker, White	20	0 - 0
Sunfish, Bluegill	10	70 - 127
Sunfish, Green	1	98 - 98
Trout, Brook	2	187 - 199
Trout, Brown (YOY)	1	92 - 92
Trout, Brown	11	102 - 369
Trout, Rainbow	1	292 - 292

Summary: This tributary to the South Branch of the Raritan River was electrofished on August 12 to assess the wild trout population. Historically, a section of Mulhockaway Creek was a Natural Trout Area with an abundant population of wild Brown Trout. Additionally, three surveys conducted between 2002 and 2003 found a mix of wild and stocked Brown, Brook, and Rainbow Trout present. Just downstream of where this survey was conducted, a major reservoir (Spruce Run Reservoir) was stocked with Rainbow Trout (until 2006) and many surveys documented their use of the Mulhockaway Creek. The section where this year's survey was conducted is currently stocked. Species encountered during this survey included 2 Brook Trout ranging from 187 – 199 mm (7.4 – 7.8 in), 1 Rainbow Trout at 292 mm (11.5 in), and 12 Brown Trout ranging from 92 – 369 mm (3.6 – 14.5 in), including 1 young-of-the-year (YOY). The assemblage of fish caught during this survey is similar to what has been captured in this system in the past with a few exceptions: Green Sunfish, an invasive species, was captured during this survey and Slimy Sculpin, a native species, for the first time in any survey conducted on the Mulhockaway Creek, was not captured. The Slimy Sculpin, considered an excellent indicator of water quality, is being evaluated in NJ to determine its state status, with preliminary indications that Threatened status may be warranted. Information gathered on this stream will be used to assess potential regulation changes for the *Wild Trout Stream* assessment. This stream currently does not have special trout fishing regulations (statewide general trout regulations apply), but it may be a good candidate for a wild trout stream regulation.

Recommendation: This 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.

Neshanic River

Date: 08/06/2015
County: Hunterdon
Township: East Amwell Twp.
Drainage: Raritan River - South Branch
Project: Invasive Species Management
Location: **Cider Mill Road Bridge, upstream**

Water Chemistry / Habitat

Water Temperature (C):	24.2
Dissolved Oxygen (mg/L):	8.82
Specific Conductance (uS/cm):	414.8
pH:	8.33
Alkalinity (mg/L):	93
Sample Length (m):	150
Habitat Assessment Score:	101 Marginal (low gradient)

Fish Species	Number	Length (mm)
Bass, Largemouth	15	59 - 179
Bass, Rock	4	93 - 118
Bass, Smallmouth	14	67 - 105
Bullhead, Yellow	28	98 - 198
Chubsucker, Creek	5	0 - 0
Darter, Tessellated	83	0 - 0
Eel, American	149	0 - 0
Killifish, Banded	30	0 - 0
Madtom, Margined	16	0 - 0
Shiner, Common	223	0 - 0
Shiner, Spotfin	58	0 - 0
Sucker, White	206	0 - 0
Sunfish, Bluegill	13	60 - 129
Sunfish, Green	37	62 - 126
Sunfish, Pumpkinseed	5	100 - 127
Sunfish, Redbreast	33	44 - 118
Weatherfish, Oriental	34	0 - 0

Summary: In order to determine the extent that the invasive Oriental Weatherfish has spread within the Raritan watershed, an electrofishing survey was conducted in the Neshanic River, using a barge, in East Amwell Township. Thirty-four specimens were found at this location, which is 4.8 miles downstream of the original documented location that was recently confirmed in a small tributary to the Neshanic River in Flemington. This information, coupled with a survey conducted during 2015 on the Raritan River South Branch in Hillsborough Township in which one individual was found, demonstrates a lack of containment. Other chemical, physical, and biological data indicate the biological integrity of this system is compromised. With the exception of the Margined Madtom, most other fish species encountered are those typically found in degraded waters, including large numbers of White Suckers, American Eels, and Green Sunfish.

Recommendation: This lack of containment within a pond or small tributary makes the success of an eradication plan very unlikely. Further field sampling is necessary to determine the extent of their distribution within the watershed.

Raritan River N/B

Date: 08/26/2015
County: Morris
Township: Mendham Twp.
Drainage: Raritan River - North Branch
Project: Wild Trout Stream Assessment
Location: **Roxiticus Road**

Water Chemistry / Habitat

Water Temperature (C):	18.6
Dissolved Oxygen (mg/L):	8.86
Specific Conductance (uS/cm):	317
pH:	7.98
Alkalinity (mg/L):	64.5
Sample Length (m):	150
Habitat Assessment Score:	154 Sub-Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	3	55 - 91
Dace, Blacknose	43	0 - 0
Dace, Longnose	50	0 - 0
Darter, Tessellated	31	0 - 0
Eel, American	4	0 - 0
Lamprey, American Brook	1	0 - 0
Sucker, White	39	0 - 0
Sunfish, Green	19	54 - 101
Sunfish, Pumpkinseed	1	52 - 52
Trout, Brown (YOY)	53	55 - 103
Trout, Brown	34	126 - 374
Trout, Rainbow	7	252 - 320

Summary: When considering streams to be assessed for inclusion within NJ's *Wild Trout Stream* regulations, data previously collected in the North Branch of the Raritan River suggested that it should be considered as a worthy candidate. This survey was conducted along Roxiticus Road at a trout stocking point. (Note: This section is actually the North Branch of the Raritan River, but is being stocked as "India Brook.") Eighty-seven wild Brown Trout up to 374 mm (14.7 in) were documented, as well as seven Rainbow Trout that were presumably stocked (based on severe fin erosion and size) during the spring of 2015. Unfortunately, public angling access in this river is limited by the large private section of Raritan Associates fishing club and the Schiff Nature Preserve which allows public access, but not in the form of angling. The American Brook Lamprey, a non-parasitic species sensitive to environmental degradation, is being evaluated in NJ to determine its state status, with preliminary indications that either Secure/Stable or Special Concern status is warranted.

Recommendation: This stream currently does not have special trout fishing regulations (statewide general trout regulations apply), but it may be a good candidate for a wild trout stream regulation. Further consideration will be given in regards to the continuation of stocking this section river. No additional surveys are necessary at this time.

Raritan River N/B

Date: 09/04/2015
County: Morris
Township: Mendham Twp.
Drainage: Raritan River - North Branch
Project: Wild Trout Stream Assessment
Location: **Mosle Road bridge, downstream**

Fish Species	Number	Length (mm)
Bass, Largemouth	5	49 - 82
Bass, Smallmouth	2	81 - 82
Dace, Blacknose	48	0 - 0
Dace, Longnose	220	0 - 0
Darter, Tessellated	16	0 - 0
Eel, American	3	0 - 0
Sucker, White	32	0 - 0
Sunfish, Redbreast	1	55 - 55
Trout, Brown (YOY)	10	63 - 102
Trout, Brown	5	160 - 327
Trout, Rainbow	4	312 - 445

Water Chemistry / Habitat

Water Temperature (C):	21.2
Dissolved Oxygen (mg/L):	9.74
Specific Conductance (uS/cm):	359.5
pH:	8.31
Alkalinity (mg/L):	71.5
Sample Length (m):	150
Habitat Assessment Score:	161 Optimal

Summary: When considering streams to be assessed for inclusion within NJ's *Wild Trout Stream* regulations, data previously collected in the North Branch of the Raritan River suggested that it ranks as a worthy candidate. This survey was conducted along Mosle Road within the Schiff Nature Preserve (which does not allow angling). This property is immediately downstream of the Raritan Associates private fishing club water. Fifteen wild Brown Trout up to 327 mm (11.0 in) were documented, as well as 4 stocked Rainbow Trout from 312 – 445 mm (12.3 - 17.5 in). The abundance of wild Brown Trout was disappointing, considering the optimal quality of the in-stream habitat and surrounding riparian zone. Three previous surveys along the upper reaches of the North Branch of the Raritan River since 2008 have produced greater numbers of wild Brown Trout, ranging from 68 to 87 individuals per survey.

Recommendation: This stream currently does not have special trout fishing regulations (statewide general trout regulations apply), but it may be a good candidate for a wild trout stream regulation. No additional surveys are necessary at this time.

Raritan River S/B

Date: 08/04/2015
County: Morris
Township: Mount Olive Twp.
Drainage: Raritan River - South Branch
Project: Regulatory
Location: **Vasa Park (YMCA dam to Raritan River S/B (trib) (SW Budd)**

Water Chemistry / Habitat

Water Temperature (C):	20.9
Dissolved Oxygen (mg/L):	8.31
Specific Conductance (uS/cm):	371.4
pH:	7.47
Alkalinity (mg/L):	36
Sample Length (m):	2407
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Bass, Largemouth	5 *	0 - 0
Bullhead, Brown	40 *	0 - 0
Bullhead, Yellow	40 *	0 - 0
Chub, Creek	400 *	0 - 0
Crappie, Black	30 *	0 - 0
Dace, Blacknose	150 *	0 - 0
Dace, Longnose	200 *	0 - 0
Darter, Tessellated	100 *	0 - 0
Eel, American	5 *	0 - 0
Killifish, Banded	7 *	0 - 0
Madtom, Margined	40 *	0 - 0
Mudminnow, Eastern	100 *	0 - 0
Perch, White	1	0 - 0
Pickerel, Chain	15 *	0 - 0
Shiner, Golden	5 *	0 - 0
Sucker, White	300 *	0 - 0
Sunfish, Bluegill	10 *	0 - 0
Sunfish, Pumpkinseed	50 *	0 - 0
Sunfish, Redbreast	10 *	0 - 0
Trout, Brook	4	161 - 200

* approximate number

Summary: A 1.5 mile stretch of the Raritan River South Branch was surveyed in Mount Olive Twp. to determine if reproducing Brown Trout (non-native) have established upstream of the old YMCA dam, which was previously exclusive to wild Brook Trout (native). During the late 2000's, DEP Dam Safety determined that this dam was to either be removed or rehabilitated as it was deemed a hazard. Before a decision was made by the property owners, an intermediate position was taken by DEP Dam Safety in which it was determined suitable to notch the dam in order to relieve the head pressure and minimize potential negative impacts. This occurred in 2008 and subsequently, staff noticed the first wild Brown Trout above the dam, with an increasing number as time progressed, although young-of-the-year were never documented. It is thought that the wild Brown Trout that inhabit the river below the dam were able to traverse the notch under high flow conditions. The establishment of reproducing Brown Trout would be considered a threat to the wild Brook Trout, and therefore considered deleterious. Fortunate for wild Brook Trout in this watershed, no Brown Trout were found during the summer of 2015 survey. Only four wild Brook Trout were found in this 1.5 mile stretch, which is near the lowest number as compared to the other seven identical surveys conducted from 2010 to 2012 which produced 84, 40, 18, 3, 34, 91, and 17 Brook Trout respectively. This wide range of numbers may convey population fluctuations or may be related to movement between the mainstem and its tributaries. Fortunately, several surveys also conducted this summer (and in recent years), indicate thriving Brook Trout populations in most of the tributaries upstream of the dam, therefore indicating the ability to recolonize.

Recommendation: It is recommended to continue to not to stock any trout species upstream of the YMCA dam. Periodically monitor the fish assemblage within this section of the South Branch of the Raritan River by repeating the techniques used during this survey.

Raritan River S/B

Date: 08/14/2015
County: Morris
Township: Mount Olive Twp.
Drainage: Raritan River - South Branch
Project: Regulatory
Location: **Stephens Mill Road, upstream**

Water Chemistry / Habitat

Water Temperature (C):	16.2
Dissolved Oxygen (mg/L):	10.59
Specific Conductance (uS/cm):	366.7
pH:	7.75
Alkalinity (mg/L):	40.5
Sample Length (m):	150
Habitat Assessment Score:	179 Optimal

Fish Species	Number	Length (mm)
Bullhead, Brown	1	167 - 167
Bullhead, Yellow	3	106 - 166
Chub, Creek	4	0 - 0
Crappie, Black	2	120 - 123
Dace, Blacknose	66	0 - 0
Dace, Longnose	26	0 - 0
Darter, Tessellated	9	0 - 0
Eel, American	14	0 - 0
Fallfish	1	0 - 0
Mudminnow, Eastern	2	0 - 0
Perch, Yellow	1	142 - 142
Pike, Northern	1	670 - 670
Sucker, White	22	0 - 0
Sunfish, Bluegill	2	87 - 135
Sunfish, Pumpkinseed	13	66 - 127
Trout, Brown (YOY)	5	57 - 74
Trout, Brown	29	109 - 440

Summary: The South Branch of the Raritan River was electrofished in both 2014 and 2015 upstream of Stephen's Mill Road in Mount Olive, which is downstream of the newly renovated YMCA/Mount Olive Complex dam at Flanders Drakestown Road. The South Branch is very popular with anglers that like to fish for wild and/or stocked trout and is also the watershed that is considered the stronghold for wild Brook Trout in NJ. Brown Trout of wild origin were the only trout species found at this location and 34 individuals were found during each of the last two summers. Eight of the Brown Trout were greater than 229 mm (9 in), with the largest at 440 mm (17.3 in), which is significant as compared to many other streams in NJ that support wild trout. Brook Trout were found during previous surveys in the vicinity, however none were found in 2014 or 2015. No stocked trout were encountered. The geological features is this stream reach, consisting of large boulders, bedrock, and steep gradient, provide optimal trout habitat, however the influence of warm water originating from Budd Lake and then the impoundment above the YMCA dam likely limit the fishery potential.

Recommendation: Data from this and other locations along the South Branch of the Raritan River from Mount Olive to High Bridge will be assessed to determine the most appropriate regulation set and stocking regime for this very popular section of river as there has been increased interest in special regulations and wild trout conservation. This section of stream currently does not have special trout fishing regulations (statewide general trout regulations apply), but it may be a good candidate for a wild trout stream regulation. An angler survey was also conducted in 2015 to provide angler creel data, preference, and opinion on this topic. No additional surveys are necessary at this time.

Raritan River S/B

Date: 07/27/2015
County: Morris
Township: Washington Twp.-Morris Co.
Drainage: Raritan River - South Branch
Project: Regulatory
Location: **Bartley WMA (Bartley Road)**

Water Chemistry / Habitat

Water Temperature (C):	23.5
Dissolved Oxygen (mg/L):	8.41
Specific Conductance (uS/cm):	321.2
pH:	8.04
Alkalinity (mg/L):	N/A
Sample Length (m):	150
Habitat Assessment Score:	157 Sub-Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	1	156 - 156
Chub, Creek	5	0 - 0
Crappie, Black	2	115 - 125
Dace, Blacknose	126	0 - 0
Dace, Longnose	51	0 - 0
Eel, American	3	0 - 0
Fallfish	37	0 - 0
Madtom, Margined	4	0 - 0
Mudminnow, Eastern	2	0 - 0
Perch, Yellow	1	150 - 150
Sculpin, Slimy	1	0 - 0
Shiner, Golden	1	0 - 0
Sucker, White	41	0 - 0
Trout, Brook (YOY)	12	62 - 90
Trout, Brook	4	145 - 182
Trout, Brown (YOY)	15	58 - 77
Trout, Brown	18	125 - 257
Trout, Rainbow	9	242 - 296

Summary: The South Branch is very popular with anglers that like to fish for wild and/or stocked trout and is also the watershed that is considered the stronghold for wild Brook Trout in NJ. The Bartley WMA section of the South Branch of the Raritan River was electrofished in both 2014 and 2015. The upper portion of this river is significantly narrower than the other locations surveyed downstream, therefore two backpack electrofishing units were used, as opposed to the electrofishing barge that was used elsewhere downstream. This section of the South Branch, down through the Ken Lockwood Gorge is known for its wild trout fishery. When sampled in the same location last summer, 38 trout were found, comprised of 35 Brown Trout, 24 of which were young-of-the-year (YOY) and 3 Brook Trout, all of which were YOY. The 2015 survey produced 58 trout, with 33 wild Brown Trout the largest of which was 257 mm (10.2 in), followed by 16 wild Brook Trout, and 9 Rainbow Trout, presumably stocked this spring as they were of appropriate size and exhibited the expected fin erosion. The Slimy Sculpin, considered an excellent indicator of water quality, is being evaluated in NJ to determine its state status, with preliminary indications that Threatened status may be warranted.

Recommendation: Data from this and other locations along the South Branch of the Raritan River from Mount Olive to High Bridge will be assessed to determine the most appropriate regulation set and stocking regime for this very popular section of river as there has been increased interest in special regulations and wild trout conservation. This section of stream currently does not have special trout fishing regulations (statewide general trout regulations apply), but it may be a good candidate for a wild trout stream regulation. An angler survey was also conducted in 2015 to provide angler creel data, preference, and opinion on this topic. No additional surveys are necessary at this time.

This location is very straight and flat, as it parallels an old railroad bed that has been converted to a walking path, and may have been historically straightened. This section of public land would greatly benefit from a stream habitat project in which a meandering thalweg is created, in addition to boulder placement, thus creating better fish habitat. A project such as this would likely hold more trout and be more appealing to fish for anglers.

Raritan River S/B

Date: 07/20/2015
County: Morris
Township: Washington Twp.-Morris Co.
Drainage: Raritan River - South Branch
Project: Regulatory
Location: **Schooley's Mtn. Road (Rt 24) upstream**

Water Chemistry / Habitat

Water Temperature (C):	24.7
Dissolved Oxygen (mg/L):	9.92
Specific Conductance (uS/cm):	449.5
pH:	8.62
Alkalinity (mg/L):	81
Sample Length (m):	150
Habitat Assessment Score:	135 Sub-Optimal

Fish Species	Number	Length (mm)
Chub, Creek	2	0 - 0
Crappie, Black	3	120 - 134
Dace, Blacknose	102	0 - 0
Dace, Longnose	198	0 - 0
Darter, Tessellated	269	0 - 0
Eel, American	3	0 - 0
Lamprey, American Brook	4	0 - 0
Madtom, Margined	1	0 - 0
Perch, Yellow	2	56 - 72
Sculpin, Slimy	129	0 - 0
Sucker, White	64	0 - 0
Sunfish, Pumpkinseed	9	60 - 82
Sunfish, Redbreast	2	74 - 99
Trout, Brook (YOY)	20	52 - 102
Trout, Brook	46	140 - 212
Trout, Brown (YOY)	33	64 - 96
Trout, Brown	30	135 - 348
Trout, Rainbow (YOY)	1	73 - 73
Trout, Rainbow	7	126 - 325

Summary: The South Branch is very popular with anglers that like to fish for wild and/or stocked trout and is also the watershed that is considered the stronghold for wild Brook Trout in NJ. A section was surveyed in Long Valley near the Schooley's Mountain Road Bridge again in 2015. This location is downstream of the Claremont Stretch, a 1.1 mile section which is regulated as a Year Round Trout Conservation Area, which has a daily limit of one trout over 15 inches, is catch and release during the preseason closure, artificial lures only, and is not stocked. The Claremont is known to produce the highest number of wild trout of any of NJ's major streams or rivers. In 2014 an electrofishing survey yielded 128 wild trout, which was more than twice as the other five surveys on this river during 2014. Wild Brown Trout were most abundant, (n= 79 individuals, 41 of which were young-of-the-year (YOY)), with the largest an impressive 475 mm (18.7 in). 2015 survey results were very similar, with a total of 131 wild trout, consisting of 66 Brook Trout, 63 Brown Trout, and two wild Rainbow Trout. Staff continues to be impressed by the abundance and size of wild trout in this river. Four stocked Rainbow Trout (fin erosion) were also found. Slimy Sculpin were abundant in 2014 (n=121) and 2015 (n=129). Slimy Sculpin and American Brook Lamprey are being evaluated in NJ to determine their state status, with preliminary indications that Threatened and Special Concern status may be warranted.

Recommendation: Data from this and other locations along the South Branch of the Raritan River from Mount Olive to High Bridge will be assessed to determine the most appropriate regulation set and stocking regime for this very popular section of river as there has been increased interest in special regulations and wild trout conservation. This section of stream currently does not have special trout fishing regulations (statewide general trout regulations apply), but it may be a good candidate for a wild trout stream regulation. An angler survey was also conducted in 2015 to provide angler creel data, preference, and opinion on this topic. No additional surveys are necessary at this time.

Raritan River S/B

Date: 07/08/2015
County: Hunterdon
Township: Tewksbury Twp.
Drainage: Raritan River - South Branch
Project: Regulatory
Location: **Vernoy Rd Bridge, downstream**

Water Chemistry / Habitat

Water Temperature (C):	20.1
Dissolved Oxygen (mg/L):	9.53
Specific Conductance (uS/cm):	360.1
pH:	8.10
Alkalinity (mg/L):	75
Sample Length (m):	150
Habitat Assessment Score:	161 Optimal

Fish Species	Number	Length (mm)
Bass, Rock	1	159 - 159
Dace, Blacknose	138	0 - 0
Chub, Creek	11	0 - 0
Dace, Longnose	205	0 - 0
Eel, American	9	0 - 0
Madtom, Margined	37	0 - 0
Sucker, White	127	0 - 0
Sunfish, Green	1	92 - 92
Sunfish, Redbreast	3	91 - 103
Trout, Brook (YOY)	3	62 - 90
Trout, Brook	4	165 - 235
Trout, Brown (YOY)	39	63 - 84
Trout, Brown	17	171 - 259
Trout, Rainbow (YOY)	4	55 - 80
Trout, Rainbow	18	130 - 324

Summary: The South Branch of the Raritan River is very popular with anglers that like to fish for wild and/or stocked trout and is also the watershed that is considered the stronghold for wild Brook Trout in NJ. A 2014 electrofishing survey was repeated in 2015 along the South Branch just downstream of the Vernoy Road bridge. In 2014 trout collected included seven wild Brook Trout including five young-of-the-year (YOY) and two older individuals, up to 210 mm (8.3 in). Forty-nine Wild Brown Trout were encountered, with 39 YOY and 10 from 200 to 270 mm (7.9 to 10.6 in). The 2015 survey results were very similar, producing seven wild Brook Trout, including three YOY and four larger individuals, up to 235 mm (9.3 in). Fifty-six wild Brown Trout were encountered, with 39 YOY and 17 from 171 to 259 mm (6.7 to 10.2 in). When last surveyed in 1995, 14 Brook Trout and 7 Brown Trout were found, which is in line with other statewide observations that indicate a shift towards increasing Brown Trout abundance, in lieu of Brook Trout. In 2014, no Rainbow Trout were stocked or encountered, however twenty-two were found in 2015. Interestingly, ten from 55 – 137 mm (2.2 – 5.4 in) are believed to be wild and twelve from 245 – 324 mm (9.6 – 12.8 in) of hatchery origin, as indicated by observed fin erosion. Wild Rainbow Trout have been appearing in electrofishing surveys with greater frequency in the South Branch in recent years.

Recommendation: Data from this and other locations along the South Branch of the Raritan River from Mount Olive to High Bridge will be assessed to determine the most appropriate regulation set and stocking regime for this very popular section of river as there has been increased interest in special regulations and wild trout conservation. An angler survey was also conducted in 2015 to provide angler creel data, preference, and opinion on this topic. No additional surveys are necessary at this time.

Raritan River S/B

Date: 07/08/2015
County: Hunterdon
Township: Lebanon Twp.
Drainage: Raritan River - South Branch
Project: Regulatory
Location: **Off Raritan River Road, near Bloeser Lane**

Water Chemistry / Habitat

Water Temperature (C):	21.4
Dissolved Oxygen (mg/L):	8.26
Specific Conductance (uS/cm):	365.7
pH:	8.09
Alkalinity (mg/L):	71
Sample Length (m):	150
Habitat Assessment Score:	150 Sub-Optimal

Fish Species	Number	Length (mm)
Bass, Rock	1	106 - 106
Bass, Smallmouth	18	104 - 385
Dace, Blacknose	17	0 - 0
Dace, Longnose	44	0 - 0
Darter, Tessellated	59	0 - 0
Eel, American	8	0 - 0
Lamprey, American Brook	1	0 - 0
Madtom, Margined	11	0 - 0
Sculpin, Slimy	1	0 - 0
Sucker, White	105	0 - 0
Sunfish, Green	3	57 - 126
Sunfish, Pumpkinseed	1	84 - 84
Sunfish, Redbreast	11	49 - 146
Trout, Brook	10	122 - 208
Trout, Brown (YOY)	1	68 - 68
Trout, Brown	15	122 - 281
Trout, Rainbow	28	246 - 432

Summary: The South Branch of the Raritan River is very popular with anglers that like to fish for wild and/or stocked trout and is also the watershed that is considered the stronghold for wild Brook Trout in NJ. The South Branch was surveyed along Raritan River Road in Lebanon Township upstream of the Ken Lockwood Gorge WMA and across from the mouths of two tributaries that have reproducing trout, Hickory Run and Little Brook. The 2014 survey produced 6 wild Brook Trout up to 249 mm (9.8 in), 16 wild Brown Trout up to 253 mm (10.0 in) including two young-of-the-year (YOY), 1 stocked Rainbow Trout at 546 mm (21.5 in), and 1 wild Rainbow Trout at 111 mm (4.4 in). With the exception of the additional 28 stocked Rainbow Trout (primarily with lengths of 246-334 mm (9.7-13.1 in) and the largest at 432 mm (17.0 in), the 2015 results were nearly identical to the 2014 survey. Ten wild Brook Trout and 16 wild Brown Trout including 1 YOY were collected. The YOY trout presence confirms a recent recommendation to upgrade the classification from *Trout Maintenance* to *Trout Production*. One Rainbow Trout with skin discolorations was submitted to Fish Pathologist for inspection and tested negative for disease. Slimy Sculpin were found at this location in both 2014 and 2015, which is the farthest downstream within this river they have been documented, however they are much more prevalent in the upper sections of the river in the vicinity of Long Valley and the Claremont Stretch TCA. Slimy Sculpin and American Brook Lamprey are being evaluated in NJ to determine their state status, with preliminary indications that Threatened and Special Concern status may be warranted.

Recommendation: Data from this and other locations along the South Branch of the Raritan River from Mount Olive to High Bridge will be assessed to determine the most appropriate regulation set and stocking regime for this very popular section of river as there has been increased interest in special regulations and wild trout conservation. An angler survey was also conducted in 2015 to provide angler creel data, preference, and opinion on this topic. No additional surveys are necessary at this time.

Water temperature may be improved with the removal of two dams in Califon. In addition, this location is fairly straight, flat, and sandy and would benefit from a stream habitat project in which a meandering thalweg and engineered riffles are created, thus allowing the river to transport sediment, creating better fish habitat.

Raritan River S/B

Date: 07/20/2015
County: Hunterdon
Township: Lebanon Twp.
Drainage: Raritan River - South Branch
Project: Regulatory
Location: **Ken Lockwood Gorge Road, Boulder Field**

Water Chemistry / Habitat

Water Temperature (C):	25
Dissolved Oxygen (mg/L):	9.76
Specific Conductance (uS/cm):	403.1
pH:	8.74
Alkalinity (mg/L):	91
Sample Length (m):	150
Habitat Assessment Score:	177 Optimal

Fish Species	Number	Length (mm)
Bass, Smallmouth	13	111 - 204
Dace, Blacknose	14	0 - 0
Dace, Longnose	131	0 - 0
Darter, Tessellated	14	0 - 0
Eel, American	18	0 - 0
Madtom, Margined	14	0 - 0
Sucker, White	110	0 - 0
Sunfish, Redbreast	1	105 - 105
Trout, Brook	1	184 - 184
Trout, Brown (YOY)	4	77 - 98
Trout, Brown	24	156 - 410
Trout, Rainbow (YOY)	2	106 - 108
Trout, Rainbow	137	approx 270 - 470

Summary: Known for its great scenery and fish habitat, the 2.5 mile section of the Raritan River South Branch known as the Ken Lockwood Gorge is very popular among anglers looking for Catch and Release / artificial lures only. Wild Brown Trout are plentiful in this section of river, with an increase in the amount of natural reproduction in recent years, however Brook Trout are rarely encountered, never with more than a few individuals. This section is stocked by the Division during the spring and fall, however the Division did not stock trout in this section of the South Branch of the Raritan River in 2014 (spring and fall), due to the Furunculosis outbreak in the Pequest Trout Hatchery. Two electrofishing surveys are routinely conducted in this stretch to assess the fish assemblage and the current Catch and Release regulations for trout. 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 49 to 73 to 70 to 168. In all years the Brown Trout were the most abundant species consisting almost exclusively wild fish, which is the foundation of the fishery. Their numbers were trending upward from 41 to 44 to 55 until this year in which to 28 were caught. When broken down by species, the greatest difference noted is in regards to Rainbow Trout, which have increased from 6 to 11 to 13 to 139 in 2015. Although the total number of Division stocked trout has remained constant over this timeframe (with the exception of no stocking in 2014), the entire allocation was Rainbow Trout (an increase) this year because Brook and Brown Trout were not raised. In regards to angler harvest of trout less than 15 inches, the previous *Year Round Trout Conservation Area* (TCA) regulations (1 trout per day greater than 15 inches) is no different than the *Year Round Catch and Release* (C&R) regulations, because in both scenarios these trout must be released. The number of trout over 9 inches (general trout minimum size, although not applied on wither the previous TCA or current C&R) has increased from 25 to 43 to 40 to 149 respectively, which meets is a management objective, however due to the abnormally high number of stocked Rainbow Trout. This was the first year of the last four in which trout over 15 inches (*Trout Conservation Area* size limit) was greater than 0 (n=2). This may have been affected by the fact that broodstock trout (generally 14 to 20 inches) were not stocked here in the fall of 2014.

Recommendation: Continue to monitor the fish assemblage within the Ken Lockwood Gorge WMA to assess the Catch and Release / artificial lures only regulations.

Raritan River S/B

Date: 07/20/2015
County: Hunterdon
Township: Lebanon Twp.
Drainage: Raritan River - South Branch
Project: Trout Special Regulation Area
Location: **Ken Lockwood Gorge Road, below trestle**

Water Chemistry / Habitat

Water Temperature (C):	22.8
Dissolved Oxygen (mg/L):	8.4
Specific Conductance (uS/cm):	406.8
pH:	8.04
Alkalinity (mg/L):	55
Sample Length (m):	150
Habitat Assessment Score:	173 Optimal

Fish Species	Number	Length (mm)
Bass, Smallmouth	12	115 - 262
Chub, Creek	1	0 - 0
Dace, Blacknose	23	0 - 0
Dace, Longnose	74	0 - 0
Darter, Tessellated	14	0 - 0
Madtom, Margined	1	0 - 0
Shiner, Common	1	0 - 0
Shiner, Spottail	1	0 - 0
Sucker, White	164	0 - 0
Sunfish, Bluegill	1	189 - 189
Trout, Brown (YOY)	3	80 - 105
Trout, Brown	21	149 - 407
Trout, Rainbow	221	approx 270 - 451

Summary: Known for its great scenery and fish habitat, the 2.5 mile section of the Raritan River South Branch known as the Ken Lockwood Gorge is very popular among anglers looking for Catch and Release / artificial lures only. Wild Brown Trout are plentiful in this section of river, with an increase in the amount of natural reproduction in recent years, however Brook Trout are rarely encountered, never with more than a few individuals. This section is stocked by the Division during the spring and fall, however the Division did not stock trout in this section of the South Branch of the Raritan River in 2014 (spring and fall), due to the Furunculosis outbreak in the Pequest Trout Hatchery. Two electrofishing surveys are routinely conducted in this stretch to assess the fish assemblage and the current Catch and Release regulations for trout. 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 47 to 53 to 143 to 245. In all years the Brown Trout were the most abundant species consisting almost exclusively wild fish, which is the foundation of the fishery. Their numbers were trending upward from 43 to 29 to 97 until this year in which to 24 were caught. When broken down by species, the greatest difference noted is in regards to Rainbow Trout, which have increased from 3 to 12 to 37 to 221 in 2015. Although the total number of Division stocked trout has remained constant over this timeframe (with the exception of no stocking in 2014), the entire allocation was Rainbow Trout (an increase) this year because Brook and Brown Trout were not raised. In regards to angler harvest of trout less than 15 inches, the previous *Year Round Trout Conservation Area* (TCA) regulations (1 trout per day greater than 15 inches) is no different than the *Year Round Catch and Release* (C&R) regulations, because in both scenarios these trout must be released. The number of trout over 9 inches (general trout minimum size, although not applied on wither the previous TCA or current C&R) has increased from 29 to 39 to 109 to 231 respectively, which meets is a management objective, however due to the abnormally high number of stocked Rainbow Trout. The number of trout greater than 15 inches (*Trout Conservation Area* size limit) went from 0 to 0 to 3 to 2. This may have been affected by the fact that broodstock trout (generally 14 to 20 inches) were not stocked here in the fall of 2014.

Recommendation: Continue to monitor the fish assemblage within the Ken Lockwood Gorge WMA to assess the Catch and Release / artificial lures only regulations.

Raritan River S/B

Date: 08/06/2015
County: Somerset
Township: Hillsborough Twp.
Drainage: Raritan River - South Branch
Project: Native Species Inventory
Location: **Studdiford Drive bridge, left side of island looking upstream**

Water Chemistry / Habitat

Water Temperature (C):	23.8
Dissolved Oxygen (mg/L):	7.87
Specific Conductance (uS/cm):	244.4
pH:	8.05
Alkalinity (mg/L):	51.5
Sample Length (m):	400
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Bass, Largemouth	3	82 - 109
Bass, Rock	11	101 - 146
Bass, Smallmouth	42	61 - 200
Bullhead, Yellow	6	40 - 239
Carp, Common	3	0 - 0
Dace, Longnose	8	0 - 0
Darter, Shield	1	0 - 0
Darter, Tessellated	82	0 - 0
Eel, American	60	0 - 0
Killifish, Banded	47	0 - 0
Madtom, Margined	4	0 - 0
Shiner, Common	24	0 - 0
Shiner, Satinfin	1	0 - 0
Shiner, Spottail	23	0 - 0
Shiner, spp. Unknown	3	0 - 0
Shiner, Swallowtail	2	0 - 0
Sucker, White	205	0 - 0
Sunfish, Green	5	0 - 0
Sunfish, Redbreast	103	0 - 157
Weatherfish, Oriental	1	155 - 155

Summary: A non-standardized electrofishing survey was conducted in the Raritan River South Branch in Hillsborough Township to better understand the distribution of freshwater fishes in larger river systems than the Bureau typically surveys. As expected, diversity was high, represented by 19 fish species. Thirteen species were native, while six are not, including two species regulated as invasive species (Green Sunfish and Oriental Weatherfish). The discovery of Oriental Weatherfish is noteworthy, as it was recently discovered in the watershed, approximately 16 miles upstream in an unnamed tributary to the Neshanic River. This lack of containment within a pond or small tributary makes the success of an eradication plan very unlikely. Bridle Shiners were found just upstream historically, however none were found during this survey. Another interesting find was the Shield Darter, not commonly found in NJ, is being evaluated to determine if its state status, with preliminary indications that Special Concern status may be warranted. This is the farthest downstream in the watershed that it has been documented.

Recommendation: Additional surveys should be conducted in the vicinity to determine if Bridle Shiners have been extirpated from the lower South Branch of the Raritan River. Additional surveys would also be instrumental in developing accurate species distribution maps used in the Delphi Process to evaluate the status of our native freshwater fishes, State Wildlife Action Plan, etc.

Non-Standardized Survey

Raritan River S/B (trib.) (Drakestown)

Date: 07/14/2015
County: Morris
Township: Mount Olive Twp.
Drainage: Raritan River - South Branch
Project: Temperature Study - TP Streams
Location: **Joy Drive, upstream from confluence with S/Br Raritan River**

Water Chemistry / Habitat

Water Temperature (C):	18.9
Dissolved Oxygen (mg/L):	10.3
Specific Conductance (uS/cm):	243.3
pH:	7.76
Alkalinity (mg/L):	27
Sample Length (m):	150
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Chub, Creek	7	0 - 0
Dace, Blacknose	81	0 - 0
Dace, Longnose	5	0 - 0
Mudminnow, Eastern	1	0 - 0
Pickerel, Chain	1	86 - 86
Shiner, Golden	1	0 - 0
Sunfish, Pumpkinseed	1	83 - 83
Trout, Brook (YOY)	77	45 - 76
Trout, Brook	33	83 - 240

Summary: This tributary to the South Branch of the Raritan River was electrofished on July 9 to assess the wild trout population structure relative to the stream temperature regime. Approximately eight electrofishing surveys have been conducted since 2009 at this location, primarily driven by Montclair State University student and Division hourly employee Luke Diglio. Data were gathered and a mark and recapture study was conducted as part of his doctoral dissertation titled, "An Assessment of New Jersey *Trout Production* Systems: A Movement Towards Sustainability." Surveys conducted here found an abundance of wild Brook Trout. Species encountered during this survey included 110 Brook Trout ranging from 45 – 240 mm (1.8 – 9.4 in), including 77 young-of-the-year (YOY), and is consistent with what was previously documented here.

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 14 *Wild Trout Streams*. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams.

Raritan River S/B (trib.) (SW of Budd Lake)

Date: 07/09/2015
County: Morris
Township: Mount Olive Twp.
Drainage: Raritan River - South Branch
Project: Temperature Study - TP Streams
Location: **Route 46 culvert, downstream from Joy Rd**

Fish Species	Number	Length (mm)
Chub, Creek	3	0 - 0
Dace, Longnose	147	0 - 0
Trout, Brook (YOY)	18	58 - 75
Trout, Brook	6	110 - 154

Water Chemistry / Habitat

Water Temperature (C): 17.6
Dissolved Oxygen (mg/L): 8.55
Specific Conductance (uS/cm): 338.8
pH: 7.79
Alkalinity (mg/L): 39
Sample Length (m): 150
Habitat Assessment Score: N/A

Summary: This tributary of the South Branch of the Raritan River was electrofished on July 9 to assess the wild trout population structure relative to the stream temperature regime. Approximately eight electrofishing surveys have been conducted since 2009 at this location, primarily driven by Montclair State University student and Division hourly employee Luke Diglio. Data were gathered and a mark and recapture study was conducted as part of his doctoral dissertation titled, "An Assessment of New Jersey *Trout Production* Systems: A Movement Towards Sustainability." Among other things, the work here discovered a healthy wild Brook Trout population and data showed that the population abundance here has the tendency to fluctuate. Surveys have been conducted throughout this stretch with varying abundance of Brook Trout. However, the variability in abundance seems to be tied to sections that provide more or less habitat. Species encountered in this survey included 24 wild Brook Trout, including 18 young-of-the-year (YOY).

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 14 *Wild Trout Streams*. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams.

Raritan River S/B (trib)(Warmwater)

Date: 08/14/2015
County: Morris
Township: Mount Olive Twp.
Drainage: Raritan River - South Branch
Project: South Branch Headwaters Study
Location: **River Road, pulloff upstream of Flanders-Drakestown Road**

Fish Species	Number	Length (mm)
Chub, Creek	47	0 - 0
Dace, Blacknose	38	0 - 0
Mudminnow, Eastern	2	0 - 0
Sucker, White	17	0 - 0

Water Chemistry / Habitat

Water Temperature (C): 18.2
Dissolved Oxygen (mg/L): 9.05
Specific Conductance (uS/cm): 181.7
pH: 7.79
Alkalinity (mg/L): 36.5
Sample Length (m): 150
Habitat Assessment Score: 171 Optimal

Summary: This small unnamed tributary was surveyed several times in recent years as part of a joint project between Luke Diglio as part of his PhD program at Montclair State University and the Division of Fish and Wildlife. This unnamed tributary to the South Branch of the Raritan River was one of eleven tributaries surveyed in the river's headwaters during this project and it was the only one in which reproducing Brook and/or Brown Trout were not initially encountered. It was hypothesized that two small impoundments are responsible for warming the tributary beyond the tolerance of trout. On approximately the eighth survey, 2 Brook Trout were eventually found. The survey conducted this summer was to determine if Brook Trout have established. Although no Brook Trout were found during the 150 m standardized survey in 2015, three Brook Trout were encountered farther upstream in a non-standardized survey that was continued afterwards. This is encouraging and may suggest that Brook Trout may be found higher up in this stream's headwaters.

Recommendation: The Lands Conservancy of New Jersey is actively acquiring property in this watershed and it would be beneficial for them to purchase the property along this stream in order to not only preserve it, but also to consider the removal of the impoundments and restoration of the stream. This stream might also be a good candidate for Brook Trout restoration. Additional surveys are recommended in the upper portion of this stream's headwaters.

Raritan River S/B (trib)(Warmwater)

Date: 08/14/2015
County: Morris
Township: Mount Olive Twp.
Drainage: Raritan River - South Branch
Project: South Branch Headwaters Study
Location: **River Road, pulloff upstream of Flanders-Drakestown Road**

Fish Species	Number	Length (mm)
Trout, Brook	3	133 - 199

Water Chemistry / Habitat

Water Temperature (C):	18.2
Dissolved Oxygen (mg/L):	9.05
Specific Conductance (uS/cm):	181.7
pH:	7.79
Alkalinity (mg/L):	36.5
Sample Length (m):	N/A
Habitat Assessment Score:	N/A

Summary: This small unnamed tributary was surveyed several times in recent years as part of a joint project between Luke Diglio as part of his PhD program at Montclair State University and the Division of Fish and Wildlife. This unnamed tributary to the South Branch of the Raritan River was one of eleven tributaries surveyed in the river's headwaters during this project and it was the only one in which reproducing Brook and/or Brown Trout were not initially encountered. It was hypothesized that two small impoundments are responsible for warming the tributary beyond the tolerance of trout. On approximately the eighth survey, 2 Brook Trout were eventually found. The survey conducted this summer was to determine if Brook Trout have established. Although no Brook Trout were found during the 150 m standardized survey in 2015, three Brook Trout were encountered farther upstream in this non-standardized survey that was continued afterwards. This is encouraging and may suggest that Brook Trout may be found higher up in this stream's headwaters.

Recommendation: The Lands Conservancy of New Jersey is actively acquiring property in this watershed and it would be beneficial for them to purchase the property along this stream in order to not only preserve it, but also to consider the removal of the impoundments and restoration of the stream. This stream might also be a good candidate for Brook Trout restoration. Additional surveys are recommended in the upper portion of this stream's headwaters.

Non-Standardized Survey

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Rinehart Brook

Date: 07/06/2015
County: Morris
Township: Chester Twp.
Drainage: Raritan River - North Branch
Project: Temperature Study - TP Streams
Location: **Hacklebarney State Park Main Trail Bridge, upstream**

Fish Species	Number	Length (mm)
Dace, Blacknose	16	0 - 0
Dace, Longnose	9	0 - 0
Trout, Brown (YOY)	55	54 - 75
Trout, Brown	39	124 - 210

Water Chemistry / Habitat

Water Temperature (C): 18.3
Dissolved Oxygen (mg/L): 9.07
Specific Conductance (uS/cm): 245.5
pH: 7.64
Alkalinity (mg/L): 35.5
Sample Length (m): 150
Habitat Assessment Score: 193 Optimal

Summary: This tributary of the North Branch of the Raritan River was electrofished on July 9 to address two project needs: (1) to assess the wild trout population structure relative to the stream temperature regime and (2) to assess the wild trout population and its status as a currently regulated *Wild Trout Stream* (WTS). Past surveys have shown that Brown Trout have displaced Brook Trout here. In a 1969 survey, Brown Trout and Brook Trout were encountered with 12 Brook Trout captured, including 8 young-of-the-year (YOY), and then in 1996 only one Brook Trout was captured. Surveys conducted in 2004 and 2014 did not document any Brook Trout. Species encountered during this survey included 94 wild Brown Trout ranging from 54 – 210 mm (2.1 – 8.3 in), including 55 YOY. Brown Trout continue to persist and may have displaced Brook Trout.

Recommendation: Investigate upstream reaches of Rinehart Brook to see if Brook Trout have been relegated to headwater sections of this brook. This survey is part of a stream temperature study that is currently being conducted on 14 *Wild Trout Streams*. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams. In addition, this 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Rocky Run

Date: 07/09/2015
County: Hunterdon
Township: Lebanon Twp.
Drainage: Raritan River - South Branch
Project: Temperature Study - TP Streams
Location: **Rocky Run Road, upstream of pond**

Fish Species	Number	Length (mm)
Dace, Blacknose	124	0 - 0
Trout, Brook (YOY)	31	55 - 77
Trout, Brook	50	86 - 191

Water Chemistry / Habitat

Water Temperature (C): 18.6
Dissolved Oxygen (mg/L): 8.24
Specific Conductance (uS/cm): 163.3
pH: 7.74
Alkalinity (mg/L): 33
Sample Length (m): 150
Habitat Assessment Score: 162 Optimal

Summary: This tributary to the South Branch of the Raritan River was electrofished on July 9 to address two project needs: (1) to assess the wild trout population structure relative to the stream temperature regime and (2) to assess the wild trout population and its status as a currently regulated *Wild Trout Stream* (WTS). A survey conducted here last year indicated an abundant population of Brook Trout with 61 of the total 69 Brook Trout captured being young-of-the-year (YOY). Species encountered in this survey included 81 wild Brook Trout ranging from 55 mm to 191 mm, including 33 YOY. In 2009, this same section was sampled and only 22 Brook Trout were captured. This may be an indication that the population has since recovered from some acute water quality issue or event, natural fluctuations in population abundance, or differences in sampling effort. The braided stream and habitat makes consistent sampling effort and analysis of data difficult to assess. Additionally, past surveys have documented Brown Trout downstream of the on-stream impoundment (the start of the survey). This impoundment is acting as a barrier to Brown Trout movement further upstream.

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 14 *Wild Trout Streams*. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams. In addition, this 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Stony Brook (Morris – Washington)

Date: 07/13/2015
County: Morris
Township: Washington Twp.-Morris Co.
Drainage: Raritan River - South Branch
Project: Temperature Study - TP Streams
Location: **Columbia Trail Walking Bridge, downstream**

Water Chemistry / Habitat

Water Temperature (C):	20.1
Dissolved Oxygen (mg/L):	9.45
Specific Conductance (uS/cm):	232.5
pH:	8.02
Alkalinity (mg/L):	39
Sample Length (m):	150
Habitat Assessment Score:	168 Optimal

Fish Species	Number	Length (mm)
Chub, Creek	3	0 - 0
Dace, Blacknose	60	0 - 0
Dace, Longnose	13	0 - 0
Darter, Tessellated	36	0 - 0
Sculpin, Slimy	164	0 - 0
Sucker, White	20	0 - 0
Sunfish, Green	1	117 - 117
Trout, Brook (YOY)	3	72 - 82
Trout, Brook	6	158 - 215
Trout, Brown (YOY)	117	43 - 88
Trout, Brown	64	102 - 265
Trout, Rainbow (YOY)	1	92 - 92
Trout, Rainbow	1	115 - 115

Summary: This tributary of the South Branch of the Raritan River was electrofished on July 9 to address two project needs: (1) to assess the wild trout population structure relative to the stream temperature regime and (2) to assess the wild trout population and its status as a currently regulated *Wild Trout Stream* (WTS). Wild Brown Trout and wild Brook Trout have coexisted in this stretch of stream since the first survey was conducted here in 1969. Species encountered during this survey included 9 wild Brook Trout ranging from 72 – 215 mm (2.8 – 8.5 in), including 3 young-of-the-year (YOY), 181 wild Brown Trout ranging from 43 – 265 mm (1.8 – 10.4 in), including 117 YOY, and 2 wild Rainbow Trout ranging from 92 – 115 mm (3.6 – 4.5 in), including one YOY. This is the first survey conducted downstream of Naughtright Rd and Columbia Trail and is more inclusive of warmwater fish species as it is further downstream from multiple ponds and impoundments that drain into it. For the same reason, more fine sediments are present. Additionally, an abundant population of Slimy Sculpin was captured here. The Slimy Sculpin, considered an excellent indicator of water quality, is being evaluated in NJ to determine its state status, with preliminary indications that Threatened status may be warranted.

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 14 *Wild Trout Streams*. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams. In addition, this 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Sun Valley Brook

Date: 07/02/2015
County: Morris
Township: Mount Olive Twp.
Drainage: Raritan River - South Branch
Project: Temperature Study - TP Streams
Location: **Wolfe Road, upstream of confluence with Raritan S/Br**

Fish Species	Number	Length (mm)
Chub, Creek	57	0 - 0
Dace, Blacknose	93	0 - 0
Dace, Longnose	12	0 - 0
Darter, Tessellated	4	0 - 0
Mudminnow, Eastern	1	0 - 0
Sucker, White	2	0 - 0

Water Chemistry / Habitat

Water Temperature (C): 17
Dissolved Oxygen (mg/L): 8.88
Specific Conductance (uS/cm): 366.1
pH: 7.37
Alkalinity (mg/L): 37
Sample Length (m): 150
Habitat Assessment Score: N/A

Summary: This tributary of the South Branch of the Raritan River was electrofished on July 2 to assess the wild trout population structure relative to the stream temperature regime. Approximately eight electrofishing surveys have been conducted since 2009 at this location, primarily driven by Montclair State University student and Division hourly employee Luke Diglio. Data were gathered and a mark and recapture study was conducted as part of his doctoral dissertation titled, "An Assessment of New Jersey *Trout Production* Systems: A Movement Towards Sustainability." Past surveys have shown that wild Brook Trout used to be present, but since 2011 they have not been found.

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 14 Wild Trout Streams. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams. This stream was included in the stream temperature study as it may be interesting to investigate possible causative factors to explain the decline of Brook Trout in this location.

Trout Brook (Hacklebarney)

Date: 07/06/2015
County: Morris
Township: Chester Twp.
Drainage: Raritan River - North Branch
Project: Temperature Study - TP Streams
Location: **Hacklebarney State Park**

Fish Species	Number	Length (mm)
Bass, Largemouth	2	33 - 34
Dace, Blacknose	121	0 - 0
Dace, Longnose	9	0 - 0
Eel, American	4	0 - 0
Trout, Brook (YOY)	132	43 - 84
Trout, Brook	62	115 - 232

Water Chemistry / Habitat

Water Temperature (C): 17.4
Dissolved Oxygen (mg/L): 9.48
Specific Conductance (uS/cm): 269.5
pH: 7.62
Alkalinity (mg/L): 54
Sample Length (m): 150
Habitat Assessment Score: 185 Optimal

Summary: This tributary of the North Branch of the Raritan River was electrofished on July 6 to assess the wild trout population structure relative to the stream temperature regime. Past surveys have found an abundant and persistent population of wild Brook Trout here and is currently regulated as one of our *Wild Trout Streams*. Species encountered during this survey included 194 wild Brook Trout ranging from 43 – 232 mm (1.7 – 9.1 in), including 132 young-of-the-year (YOY). Largemouth Bass, Blacknose Dace, and Longnose Dace were also encountered during the survey. Approximately 150 meters downstream from the start of our survey is a natural barrier that has blocked any migration upstream. Brown Trout and Brook Trout are known to co-exist here but it would be interesting to study to what extent and how competition may be affecting Brook Trout.

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 14 *Wild Trout Streams*. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams. In addition, this 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Turkey Brook

Date: 07/02/2015
County: Morris
Township: Mount Olive Twp.
Drainage: Raritan River - South Branch
Project: Temperature Study - TP Streams
Location: **Stephens Mill Road**

Water Chemistry / Habitat

Water Temperature (C):	16.1
Dissolved Oxygen (mg/L):	9.44
Specific Conductance (uS/cm):	285.8
pH:	7.81
Alkalinity (mg/L):	32
Sample Length (m):	150
Habitat Assessment Score:	N/A

Fish Species	Number	Length (mm)
Chub, Creek	10	0 - 0
Dace, Blacknose	28	0 - 0
Dace, Longnose	6	0 - 0
Mudminnow, Eastern	1	0 - 0
Sculpin, Slimy	65	0 - 0
Trout, Brook (YOY)	31	53 - 79
Trout, Brook	18	105 - 177
Trout, Brown (YOY)	33	42 - 72
Trout, Brown	17	99 - 276

Summary: This tributary of the South Branch of the Raritan River was electrofished on July to address two project needs: (1) to assess the wild trout population structure relative to the stream temperature regime and (2) to assess the wild trout population and its status as a currently regulated *Wild Trout Stream*. Approximately eight electrofishing surveys have been conducted since 2009 at this location, primarily driven by Montclair State University student and Division hourly employee Luke Diglio. Data were gathered and a mark and recapture study was conducted as part of his doctoral dissertation titled, "An Assessment of New Jersey *Trout Production* Systems: A Movement Towards Sustainability." Past surveys have shown an abundant and persistent population of wild Brook Trout and wild Brown Trout. Species encountered during this survey included 49 wild Brook Trout ranging from 53 – 177 mm (2.1 – 7.0 in), including 31 young-of-the-year (YOY), and 50 wild Brown Trout ranging from 42 – 276 mm (1.7 – 10.9 in), including 33 YOY. Other species encountered during this survey include Slimy Sculpin, Eastern Mudminnow, Blacknose Dace, Longnose Dace, and Creek Chub. The Slimy Sculpin, considered an excellent indicator of water quality, is being evaluated in NJ to determine its state status, with preliminary indications that Threatened status may be warranted. Species and abundance of species found during this survey are consistent with what was found in the past.

Recommendation: This survey is part of a stream temperature study that is currently being conducted on 14 *Wild Trout Streams*. This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams. In addition, this 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

Willhoughby Brook

Date: 07/07/2015
County: Hunterdon
Township: Lebanon Twp.
Drainage: Raritan River - South Branch
Project: Temperature Study - TP Streams
Location: **Route 31, upstream**

Water Chemistry / Habitat

Water Temperature (C):	19.2
Dissolved Oxygen (mg/L):	8.47
Specific Conductance (uS/cm):	205.1
pH:	7.67
Alkalinity (mg/L):	52
Sample Length (m):	150
Habitat Assessment Score:	149 Sub-Optimal

Fish Species	Number	Length (mm)
Bass, Largemouth	3	35 - 56
Bullhead, Yellow	2	87 - 91
Dace, Blacknose	21	0 - 0
Dace, Longnose	11	0 - 0
Darter, Tessellated	6	0 - 0
Eel, American	2	0 - 0
Sucker, White	7	0 - 0
Sunfish, Bluegill	1	136 - 136
Sunfish, Green	3	75 - 78
Sunfish, Pumpkinseed	1	102 - 102
Sunfish, Redbreast	1	119 - 119
Trout, Brook	5	140 - 170
Trout, Brown (YOY)	23	57 - 72
Trout, Brown	21	142 - 291

Summary: This tributary to the South Branch of the Raritan River was electrofished on July 7 to address two projects: (1) assess the wild trout population structure relative to the stream temperature regime and (2) to assess the wild trout population and its status as a currently regulated *Wild Trout Stream*. A survey conducted over a mile upstream from this location last year indicated abundant populations of wild Brook Trout and wild Brown Trout. Species encountered in this survey included 44 wild Brown Trout ranging from 57 – 291 mm (2.2 – 11.5 in), including 23 young-of-the-year (YOY), and 5 wild Brook Trout ranging from 140 – 170 mm (5.5 – 6.7 in). Many more adults were found this year as opposed to the survey last year. Deep, undercut banks and large pools in this downstream area create better habitat for larger trout. This information is useful as it shows adult wild trout inhabit a different section of Willhoughby Brook and larger, more desirable wild trout are available to catch for the angler. However, of concern in the section that was surveyed was an increased number of warmwater species that may be competing for similar resources as the wild trout. This survey was in close proximity to its convergence with Spruce Run Reservoir and downstream of a few impoundments.

Recommendation: This stream will be monitored in this section for the next 2-3 years to study the relationship of stream temperature on wild trout life cycles in New Jersey and help guide management of our *Trout Production* streams. Information from the surveys done this year and the past will be used to determine and form new *Wild Trout Stream* regulations. In addition, this 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. This stream should be periodically monitored in accordance with the established schedule (every five years for a *Wild Trout Stream*).

APPENDIX B

2015 LAKE DISSOLVED OXYGEN / TEMPERATURE PROFILE DATA

Dissolved oxygen/temperature profiles are performed to determine a lakes 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-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 < 21ºC (69.8ºF) and dissolved oxygen > 4 mg/L (Appendix A).

Surveys in the Upper Delaware Region
(Upper Delaware & Wallkill)

Results of a temperature-dissolved oxygen profile conducted on Iliff Lake in 2015 to determine its trout supporting status. Boldfaced data indicate trout supporting water (temperature ≤ 21ºC and dissolved oxygen ≥ 4 mg/L).

Waterbody	Iliff Lake
Region	Upper Delaware
Drainage	Pequest
County	Sussex
Survey date	8/25/2015
Secchi Disk	9.3 ft

Depth from surface (ft)	Water temp. (°C)	Dissolved oxygen (mg/L)
0	22.0	7.06
3	26.7	6.90
5	26.4	6.81
7	26.3	6.85
8	26.2	6.53
9	25.9	5.03
10	25.5	4.57
11	25.1	5.00
12	24.0	5.92
13	22.9	5.67
14	20.9	5.00
15	18.8	3.81
16	17.6	2.82
17	16.5	1.84
18	15.4	0.98
19	14.0	0.70
20	12.3	0.64
21	10.8	0.79
22	9.2	0.99
23	8.3	1.00
24	7.7	1.24
26	7.0	0.16
28	7.7	0.16
30	8.0	0.20

Surveys in the Upper Delaware Region (Upper Delaware & Wallkill) (continued)

Results of a temperature-dissolved oxygen profile conducted on Tilcon Lake in 2015 to determine its trout supporting status. Boldfaced data indicate trout supporting water (temperature ≤ 21ºC and dissolved oxygen ≥ 4 mg/L).

Waterbody	Tilcon Lake
Region	Upper Delaware
Drainage	Musconetcong River
County	Morris
Survey date	8/25/2015
Secchi Disk	25 ft

Depth from surface (ft)	Water temp. (°C)	Dissolved oxygen (mg/L)
0	27.9	7.70
5	27.7	7.72
10	27.0	7.76
11	26.9	7.62
13	26.8	7.59
15	26.7	7.14
17	26.3	7.45
18	25.4	8.88
19	24.5	10.24
20	22.5	12.27
21	20.6	13.01
22	19.1	12.48
23	17.7	12.47
24	16.3	12.19
25	15.5	11.79
26	14.5	11.68
28	13.1	10.54
30	12.0	9.91
32	10.7	10.14
34	9.8	10.09
36	9.0	9.08
38	8.5	8.76
40	7.6	7.15
45	7.0	4.29
50	6.7	0.53

Surveys in the Southern Region
(Lower Delaware River and Lower Atlantic Coastal)

Results of a temperature-dissolved oxygen profile conducted on South Vineland Park Pond in 2015 to determine its trout supporting status. Boldfaced data indicate trout supporting water (temperature $\leq$ 21ºC and dissolved oxygen $\geq$ 4 mg/L).

Waterbody	South Vineland Park Pond
Region	Lower Delaware
Drainage	Maurice River
County	Cumberland
Survey date	7/30/2015
Secchi Disk	N/A

Depth from surface (ft)	Water temp. (°C)	Dissolved oxygen (mg/L)
0	29.9	7.00
1	29.9	6.61
2	29.9	6.95
3	29.9	6.89
4	29.9	6.85
5	29.9	6.74
6	29.7	6.45
7	28.5	5.21
8	27.2	2.56
9	27.1	2.07
10	23.0	0.18
11	21.7	0.15
12	21.2	0.13
13	18.6	0.15
14	16.8	0.28
15	16.2	0.47
16	15.3	0.81
17	13.2	1.05
18	12.3	0.68
19	11.4	0.17
20	10.9	0.17
21	10.3	0.18
22	9.8	0.18
23	9.3	0.19
24	9.2	0.20
25	9.2	0.22
26	9.2	0.22
27	9.1	0.26
28	9.2	0.30

APPENDIX C

Field Sampling Protocols
Lake Profiles and Wadeable Streams

Lakes – Dissolved Oxygen / Temperature Profiles

Most New Jersey lakes deeper than 3 m (10 ft) thermally stratify during the summer. The epilimnion (surface waters) becomes 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. New Jersey lakes are characteristically shallow and therefore most are too warm to support trout through the critical summer months. They are however quite suitable for a multitude of other cool and warmwater species. The criteria used to determine a lake's trout-supporting capabilities is water temperature $\leq$ 21ºC (69.8ºF) and dissolved oxygen $\geq$ 4 mg/L (Hamilton and Barno 2006).

Dissolved oxygen and temperature profiles are performed during mid–August at the deepest point of the impoundment using a YSI oxygen 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.

For QA/QC purposes oxygen meters are re-verified on a monthly basis against a Winkler Titration of deionized water samples. The re-verification procedure is also repeated after any atypical field readings to verify the meter is functioning properly. Meters are field calibrated prior to each use according to the manufacturer specifications.

Wadeable Streams - Electrofishing

As with lakes the summer months are a critical time period for trout survival due to elevated temperatures, lower dissolved oxygen concentrations, and reduced flows. Streams are sampled from June through mid September of each year using electrofishing gear. Electrofishing provides for the safe, effective sampling of resident fishes with limited associated mortality. Prior to 1980, A.C. electrofishing equipment was used to sample stream fish populations. This sampling gear consisted of two or three paddle-type electrodes powered by a gas generator and operated by a four to six person crew (two or three electrode-bearers, one or two netters, and one generator operator). With technological advances in electrofishing gear, D.C. electrofishing equipment, powered by battery or generator, has been used almost exclusively since 1980. A battery-powered D.C. backpack unit, having one paddle-type electrode and used by an operator and one or two netters, has been in used since 1980 to sample small streams. On larger streams a gas generator is used in conjunction with a conversion box (to convert A.C. to D.C.), two or three electrodes, and a five to seven person field crew.

The standard sampling distance, which has been used during and since the original stream surveys, is 182.9 meters (600 feet). This length was occasionally shortened when trout reproduction was found or when conditions such as an abundance of warmwater species or physical stream conditions indicated that trout would not be found. Occasionally a prospective stream or site would not be sampled based upon a visual, water temperature, or pH check that indicated conditions unsuitable for trout. Lack of water, excessive turbidity, temperatures in excess of 24°C, and extremely low pH values (4.0 or less) would result in sampling site rejection. Since 2001, in an effort to standardize data collection efforts across various research and field inventories a distance of 150 meters was established and is used on streams when young-of-the-year trout are encountered. Since the development of the Incidence of Occurrence was based on a sampling distance of 182 meters (600 feet) this distance is still used for classifying streams when young of the year trout are not encountered.

Sampling methods follow those outlined by Kurtenbach (Kurtenbach, 1994) and as defined in the EPA manual “Rapid Bioassessment Protocols for Use in Wadeable Streams and Rivers” (Barbour 1999) and are consistent, for comparative purposes, with data collection efforts for other Activities. All sites are sampled under typical stream flows during the months of June through September. Electrofishing gear is used to provide pulsed direct current to collect fishes. Settings on each of the stream units vary depending on the conductivity and flow conditions at each site, output usually ranges from 3 to 4 amperes. A typical backpack field crew consists of three persons, one to wear the backpack and netters. Stream widths exceeding the capabilities of one backpack unit are either sampled with two backpack teams traveling in tandem or with a two-paddle streamside generator. The type of unit selected is based upon stream width, depth, and contour of the stream environment. One up-stream pass is made through the sample stretch.

The sample stretch length is 150 meters for streams having naturally reproducing trout populations and 182 meters (600 feet) for trout maintenance or non trout waters. Sampling time averages approximately 2.5 hours per site.

All fish encountered are collected without bias to species or size. Fishes with lengths greater than 20 mm are identified to the species level, counted, and examined for disease or anomalies. Anomalies such as visible lesions, tumors, skeletal anomalies, and fin damage may be an indication of impaired conditions. Any obvious injuries due to electrofishing are noted, but not considered anomalies. Total length measurements are taken on all trout and other game species. Retained specimens are preserved in 10% formalin solution in the field. Specimens are then transferred to a 70% ethanol solution for long-term preservation 2-3 weeks after initial collection.

In addition to fish collection, basic physical and chemical parameters of the stream environment are also measured and recorded on the Bureau's Stream Survey Data Sheet. All physical and chemical data are collected one-time-only, thus no long-term data is collected. Physical parameters included stream depth, stream width, substrate type, and shade index. YSI Model 85 and YSI Model 60 meters are used to determine chemical parameters such as dissolved oxygen, temperature, salinity, conductivity, and pH. For QA/QC purposes oxygen meters are re-verified on a monthly basis against a Winkler Titration of deionized water samples. The re-verification procedure is also repeated after any atypical field readings to verify the meter is functioning properly. Meters are field calibrated prior to each use according to the manufacturer specifications. Alkalinity and specific conductance data have been collected since 2002. In-house laboratory staff determine alkalinity via titration. The reference temperature and temperature coefficient for specific conductance are 25°C and 1.91% respectively.

A stream habitat assessment is also conducted at each site, in accordance with criteria established by the EPA (EPA 1999). The habitat assessment is intended to evaluate various aspects of the aquatic habitat, surrounding terrestrial environment, and potential anthropogenic factors that may impact the aquatic biota of the stream. Habitat Assessments have been designed for two stream types - high gradient (riffle/run prevalent) and low gradient (glide/pool prevalent) streams. High Gradient Habitat Assessments are conducted on most streams north of the Fall line, in the Piedmont, Highlands, and Appalachian Valley and Ridge physiographic provinces. Natural high-gradient streams have substrates composed primarily of coarse sediment particles (i.e. gravel or larger) or frequent coarse particulate aggregations along stream reaches. Low gradient habitat assessments are conducted on streams in the Coastal Plain and in other moderate to low gradient landscapes. Natural low gradient streams have substrates of fine sediment or infrequent aggregations of more coarse (gravel of larger) sediment particles along stream reaches. Data are recorded on the Bureau's High Gradient Habitat Assessment Data Sheet and Low Gradient Habitat Assessment Data Sheet (Appendix B).

For the habitat assessment, ten specific physical parameters are assessed. For a low gradient stream the parameters are: epifaunal substrate, pool substrate, pool variability, sediment deposition, channel flow status, channel alteration, channel sinuosity, bank stability, vegetative protection, and riparian vegetative zone width. The assessment for a high gradient stream substitutes pool substrate, pool variability, and channel sinuosity with embeddedness, velocity/depth regime, and frequency of riffles or bends. The first five parameters of each assessment are assessed within the stretch of the stream electrofished. Assessments of the five remaining variables are based upon a larger stream reach that extends 150 meters upstream and downstream of the electrofished stretch. Each assessment variable is divided into four condition categories: optimal, sub-optimal, marginal, and poor, each with established criteria. Twenty points are allotted for each of the ten variables resulting in a maximum score of 200. The left and right banks of a stream, determined by facing downstream, are assessed separately for bank stability, vegetative protection, and riparian vegetative zone width. Biologists from the Bureau of Freshwater Fisheries have received habitat assessment training from EPA staff.

APPENDIX D

Habitat Assessment Data Sheets

NJ Division of Fish and Wildlife

Bureau of Freshwater Fisheries

Habitat Assessment - Datasheet

High Gradient Streams

Stream Name		Date
Location		
WMA	Drainage	
Assessment Completed By:	Weather	

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1. Epifaunal Substrate **Available Cover**	Greater than 70 % of substrate favorable for epifaunal colcnization and fish cover;mix of snags submerged logs, undercut banks cobble and other stable habitat and at stage to allow full colonization potentia. (Logs/snag are not new fall and not transient.)	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale)	20-40 % mix of stable habitat;habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
2. Embeddedness Assessed in riffle area	Gravel, cobble and boulder particles are 0-25 % surrounded by fine sediment. Cobble layering provides habitat diversity.	Gravel, cobble and boulder particles are 25-50 % surrounded by fine sediment	Gravel, cobble and boulder particles are 50-75% surrounded by fine sediment	Gravel, cobble and boulder particles are more than 75 % surrounded by fine sediment
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
3. Velocity/Depth Regime	All four velocity/depth regimes are present: (slow-deep, slow-shallow, fast deep, fast shallow) Slow is < 0.3 m/s, deep is > 0.5 m	Only 3 of the 4 regimes are present. If fast-shallow is missing, score lower than if missing other regimes.	Only 2 of the 4 regimes are present. If fast-shallow or slow shallow are missing score low.	Dominated by 1 velocity/depth regime. Usually slow deep
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5 % of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5 -30% of the bottom affected; slight deposition in pools	Moderate depostion of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected;sediment deposits at obstructions, constrictons and bends;moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development;more than 50% of the bottom changing frequently;pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present in standing pools
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

Above parameters are to be evaluated for the length of the sample reach only.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present;usually in areas of bridge abutments;evidence of past channelization, ie. dredging (greater than past 20 yr) may be present but recent channelization is not	Extensive channelization and/or embankments or shoring structures present on both banks; and 40-80% of the stream reach is channelized and disrupted.	Banks shored with gabion or cement;over 80% of the stream reach channelized and disupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
7. Frequency of Riffles (or bends)	Occurrence of riffles relatively frequent;ratio of distance between riffles divided by width of stream < 7:1 (generally 5 to 7);In streams where riffles are continuous, placement of boulders or other large natural obstructions is important. Variety of habitat is key.	Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 and 15.	Occassional rifle or bend, bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 and 25	Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio > 25.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
8. Bank Stability Left and right bank determined by facing downstream	Banks stable:evidence of erosion or bank failure absent or minimal;little or potential for future problems. < 5% of the bank affected	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion;high erosion potential during floods.	Unstable;many eroded areas:"raw" areas frequent along straight sections and bends;obvious bank sloughing;60-100% of bank has erosional scars.
SCORE	**Left Bank** 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non woody plants; vegetative disruption through grazing or mowing minimal or not evident;almost all plants allowed to grow naturally	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented;disruption evident but not affecting full growth potential to any great extent;more than 1/2 potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation;disruption obvious;patches of bare soil or closely cropped vegetation common;less than one-half of the potential plant stubble height remaining..	Less than 50 % of the streambank surfaces covered by vegetation;disruption of streambank is very high;vegetation has been removed to 5 cm or less tin average stubble height.
SCORE	**Left Bank** 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width	Width of riparian zone > 18 meters;human activities (i.e. parking lots, roadbeds, clear cuts, lawns or crops) have not impacted zone.	Width of riparian zone 12-18 meterts;human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters;human activities have impacted zone agreat deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE	**Left Bank** 10 9	8 7 6	5 4 3	2 1 0
	Right Bank 10 9	8 7 6	5 4 3	2 1 0

Above parameters are to be evaluated 1 sampling length broader upstream and 1 sampling length broader downstream

TOTAL SCORE ☐

NJ Division of Fish and Wildlife
Bureau of Freshwater Fisheries

Habitat Assessment - Datasheet
Low Gradient Streams

Fish and Wildlife

Stream Name		Date
Location		
WMA	Drainage	
Assessment Completed By:	Weather	

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
1.Epifaunal Substrate / Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags,submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e. logs/snags that are not new fall and not transient)	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale)	10-30% mix of stable habitat;habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
2. Pool Substrate	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud or clay; mud may be dominant; some root mats and submerged vegetation present	All mud or clay or sand bottom; little or no root mat;no submerged vegetation	Hard-pan clay or bedrock;no root mat or vegetation
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
3. Pool Variability	Even mix of large-shallow (> half the stream cross section and < 1 m deep), large-deep(> half the stream cross section and > 1 m deep), small shallow (< half the stream cross section and < 1 m depth), small-deep (< half the stream cross section and > 1m depth) pools present.	Majority of pools large deep; very few shallow pools present (< 1 m in depth)	Shallowpools (< 1 m depth) much more prevalent than deep pools (> 1 m depth)	Majority of pools small and shallow (< half the stream cross section and < 1m in depth) or pools absent.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 20 % of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools	Moderate depostion of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected;sediment deposits at obstructions, constrictons and bends;moderate deposition of pools	Heavy deposits of fine material, increased bar development;more than 80% of the bottom changing frequently;pools almost absent due to substantial sediment deposition.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills > 75% of the available channel; or < 25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present in standing pools
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1

Above parameters are to be evaluated for the length of the sample reach only.

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
6.Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern	Some channelization present;usually in areas of bridge abutments;evidence of past channelization, ie. dredging (greater than past 20 yr) may be present but recent channelization is not	Extensive channelization and/or embankments or shoring structures present on both banks; and 40-80% of the stream reach is channelized and disrupted.	Banks shored with gabion or cement;over 80% of the stream reach channelized and disupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was a straight line. (Note-channel braiding is considered normal in coastal plains and other low lying areas. This parameter is not easily rated in these	The bends in the stream increase the stream length 1 to 2 times longer if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1
8. Bank Stability Left and right bank determined by facing downstream	Banks stable:evidence of erosion or bank failure absent or minimal;little or potential for future problems. < 5% of the bank affected	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion;high erosion potential during floods.	Unstable;many eroded areas:"raw" areas frequent along straight sections and bends;obvious bank sloughing;60-100% of bank has erosional scars.
SCORE **Left Bank**	10 9	8 7 6	5 4 3	2 1 0
SCORE **Right Bank**	10 9	8 7 6	5 4 3	2 1 0
9. Vegetative Protection	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or non woody macrophytes;vegetative disruption through grazing or mowing minimal or not evident;almost all plants allowed to grow naturally	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well represented;disruption evident but not affecting full growth potential to any great extent;more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation;disruption obvious;patches of bare soil or closely cropped vegetation common;less than one-half of the potential plant stubble height remaining.	Less than 50 % of the streambank surfaces covered by vegetation;disruption of streambank is very high;vegetation has been removed to 5 cm or less in average stubble height.
SCORE **Left Bank**	10 9	8 7 6	5 4 3	2 1 0
Right Bank	10 9	8 7 6	5 4 3	2 1 0
10. Riparian Vegetative Zone Width	Width of riparian zone > 18 meters;human activities (i.e. parking lots, roadbeds, clear cuts, lawns or crops) have not impacted zone.	Width of riparian zone 12-18 meterts;human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters;human activities have impacted zone agreat deal.	Width of riparian zone < 6 meters; little or no riparian vegetation due to human activities.
SCORE **Left Bank**	10 9	8 7 6	5 4 3	2 1 0
Right Bank	10 9	8 7 6	5 4 3	2 1 0

Above parameters are to be evaluated 1 sampling length broader upstream and 1 sampling length broader downstream

TOTAL SCORE ☐

APPENDIX E

List of New Jersey Freshwater Fishes
(Revised 2015)

Scientific Name	Common Name	Trophic Guild	Tolerance	Historical Presence
Petromyzontidae:				
Lampetra appendix	American Brook Lamprey	NF	IS	N
Petromyzon marinus	Sea Lamprey	PF	MT	N
Acipenseridae:				
Acipenser brevirostrum	Shortnose Sturgeon	BI	IS	N
Acipenser oxyrhynchus	Atlantic Sturgeon	BI	IS	N
Lepisosteidae:				
Lepisosteus osseus	Longnose Gar	P	M	EX
Amiidae:				
Amia calva	Bowfin	P	TS	US
Anguillidae:				
Anguilla rostrata	American Eel	P	TS	N
Monopterus albus	Asian Swamp Eel	G	TS	E
Clupeidae:				
Alosa aestivalis	Blueback Herring	PL	MT	N
Alosa mediocris	Hickory Shad	I/P	US	N
Alosa pseudoharengus	Alewife	PL	MT	N
Alosa sapidissima	American Shad	PL	MT	N
Drosoma cepedianum	Gizzard Shad	G	TS	N
Salmonidae:				
Oncorhynchus mykiss	Rainbow Trout	I/P	IS	NN
Salmo salar	Atlantic (Landlocked) Salmon	P	IS	NN
Salmo trutta	Brown Trout	I/P	IS	E
Salvelinus fontinalis	Brook Trout	I/P	IS	N
Salvelinus namaycush	Lake Trout	P	IS	NN
Osmeridae:				
Osmerus mordax	Rainbow Smelt	I	IS	N
Umbridae:				
Umbra pygmaea	Eastern Mudminnow	I	TS	N
Channidae				
Channa Argus	Northern Snakehead	P	TS	E

Scientific Name	Common Name	Trophic Guild	Tolerance	Historical Presence
Esocidae:				
Esox americanus	Redfin Pickerel	P	MT	N
Esox lucius	Northern Pike	P	IS	NN
Esox masquinongy	Muskellunge	P	IS	NN
Esox niger	Chain Pickerel	P	MT	N
Cyprinidae:				
Carassius auratus	Goldfish	G	TS	E
Carpiodes cyprinus	Quillback	BI	TS	N
Cyprinus carpio	Common Carp	G	TS	E
Exoglossum maxillingua	Cutlip Minnow	BI	IS	N
Hybognathus regius	Eastern Silvery Minnow	H	MT	N
Notemigonus crysoleucas	Golden Shiner	G	TS	N
Notropis amoenus	Comely Shiner	I	TS	N
Cyprinella analostana	Satinfin Shiner	I	TS	N
Cyprinella spiloptera	Spotfin Shiner	I	TS	N
Margariscus margarita	Pearl Dace	G	MT	N
Notropis bifrenatus	Bridle Shiner	I	IS	N
Notropis chalybaeus	Ironcolor Shiner	I	IS	N
Luxilis cornutus	Common Shiner	I	MT	N
Notropis husdonius	Spottail Shiner	I	MT	N
Notropis procne	Swallowtail Shiner	I	MT	N
Pimephales notatus	Bluntnose Minnow	G	TS	NN
Pimephales promelas	Fathead Minnow	G	TS	NN
Rhinichthys atratulus	Blacknose Dace	BI	TS	N
Rhinichthys cataractae	Longnose Dace	BI	MT	N
Semotilus atromaculatus	Creek Chub	I	TS	N
Semotilus corporalis	Fallfish	I	MT	N
Ctenopharyngodon idella	Grass Carp	H	MT	E
Catostomidae:				
Catostomus commersoni	White Sucker	BI	TS	N
Erimyzon oblongus	Creek Chubsucker	BI	MT	N
Hypentelium nigricans	Northern Hog Sucker	BI	IS	N
Ictaluridae:				
Ameiurus catus	White Catfish	I/P	MT	N
Ameiurus melas	Black Bullhead	BI	MT	NN
Ameiurus natalis	Yellow Bullhead	BI	MT	N
Ameiurus nebulosus	Brown Bullhead	BI	TS	N
Ictalurus punctatus	Channel Catfish	I/P	MT	NN
Noturus gyrinus	Tadpole Madtom	BI	MT	N
Noturus insignis	Margined Madtom	BI	IS	N
Pylodictis olivaris	Flathead Catfish	P	TS	NN
Aphredoderidae:				
Aphredoderus sayanus	Pirate Perch	I	MT	N

Scientific Name	Common Name	Trophic Guild	Tolerance	Historical Presence
Cyprinodontidae:				
Fundulus diaphanus	Banded Killifish	I	TS	N
Fundulus heteroclitus	Mummichog	I	TS	N
Poeciliidae:				
Gambusia affinis	Mosquitofish	I	TS	NN
Gambusia holbrooki	Eastern Mosquitofish	I	TS	N
Gasterosteidae:				
Apletes quadracus	Fourspine Stickleback	I	MT	N
Gasterosteus aculeatus	Threespoine Stickleback	I	MT	N
Pungitius pungitius	Ninespine Stickleback	I	MT	N
Moronidae:				
Morone americana	White Perch	I/P	MT	N
Morone saxatilis	Striped Bass	P	MT	N
Centrarchidae:				
Acantharchus pomotis	Mud Sunfish	I	MT	N
Ambloplites rupestris	Rock Bass	I/P	MT	NN
Enneacanthus chaetodon	Blackbanded Sunfish	I	IS	N
Enneacanthus gloriosus	Bluespotted Sunfish	I	IS	N
Enneacanthus obesus	Banded Sunfish	I	IS	N
Lepomis auritus	Redbreast Sunfish	I	MT	N
Lepomis cyanellus	Green Sunfish	I/P	TS	NN
Lepomis gibbosus	Pumpkinseed	I	MT	N
Lepomis gulosus	Warmouth	I/P	TS	NN
Lepomis macrochirus	Bluegill	I	TS	NN
Micropterus dolomieu	Smallmouth Bass	I/P	MT	NN
Micropterus salmoides	Largemouth Bass	P	MT	NN
Pomoxis annularis	White Crappie	I/P	TS	NN
Pomoxis nigromaculatus	Black Crappie	I/P	MT	NN
Percidae:				
Etheostoma fusiforme	Swamp Darter	BI	IS	N
Etheostoma olmstedi	Tessellated Darter	BI	MT	N
Perca flavescens	Yellow Perch	I/P	MT	N
Percina peltata	Shield Darter	BI	IS	N
Sander vitreus	Walleye	P	IS	NN
Cottidae:				
Cottus cognatus	Slimy Sculpin	BI	IS	N
Cobitidae:				
Misgurnus anguillicaudatus	Oriental Weatherfish	G	TS	E
Soleidae:				
Trinectes maculatus	Hogchoker	G	IS	N

Key:

Abbreviation	Term	Definition
Trophic Guild		
BI	Benthic Insectivore	Specialist feeder that primarily consumes insects taken from the bottom substrate.
H	Herbivore	A species that consumes plant and algae materials.
I	Insectivore	A species that consumes primarily insects.
NF	Nonparasitic Filterer	A species that feeds by filtering algae and other microorganisms found in detritus.
G	Generalist	A species that consumes a wide variety of food types from a wide variety of habitats.
P	Piscivore	A species that primarily consumes fish.
PF	Parasitic Filterer	A species that feeds by attaching to and rasping a hole in the side of a large fish.
PL	Planktivore	A species that consumes small organisms (algae and animals) that float in the water column.
Historical Presence		
E	Exotic	A non-native species introduced from a foreign country.
EX	Extirpated	A native species no longer present, either as a result of natural causes or because of eradication by humans.
N	Native	In the U.S., a species historically occurring in a geographic range previous to the arrival of the first European settlers.
NN	Non-Native	A species found outside of their historical range. The occurrence of a non-native species may be a result of intentional stocking (sportfish or biological control), unintentional stocking (escape), or a response to habitat/climatic changes.
Tolerance		
IS	Intolerant Species	A species most sensitive to environmental degradation. These species have historical distributions significantly greater than presently occurring populations.
TS	Tolerant Species	A species least sensitive to environmental degradation. These species can withstand stressful environmental conditions and often become a dominant member in the fish assemblage.
Miscellaneous		
US	Uncertain Status	An assignment in which there is not enough data or no general consensus to make a confident classification at this point in time.

Stream Temperature Monitoring Report (2015)

Investigations and Management of New Jersey's Freshwater Fisheries Resources (APPENDIX F)

By
Scott Collenburg, Assistant Fisheries Biologist

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

Sportfish Restoration Grant F-48-R

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

Introduction

Studies have shown that stream temperature is the main determinant of fish species distribution and slight fluctuations in water temperature can severely influence fish species absence\occurrence. Temperature is especially important to cold-water species of fish such as trout, as elevated stream temperatures can be lethal, and chronic exposure to sublethal temperatures can affect their growth, reproduction, and tolerance to pollutants or disease. Continuous temperature monitoring provides Bureau of Freshwater Fisheries staff with reliable data that can be used to guide management decisions related to fish stocking, fish and habitat restoration, and fishing regulations.

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 is 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 in 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 has been renewed annually.

In 2015 water temperature was monitored at 39 sites (Figure 1 and Table 1), including 2 new sites on the Black River (below Kay's Pond and south of Rte. 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 were located on 17 recreationally important, major 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-NT (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 streams (Figure 1). The other fourteen sites will be reported on separately as they are a part of a three year study designed to collect three years of year-round stream temperature monitoring, electrofishing surveys in these same locations, and then to develop a year to year analysis of how stream temperature is influencing New Jersey's wild trout populations, submit data to NJDEP to determine if any streams qualify as part of 303(d) list, and 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 management of wild trout streams.

Figure 1. Locations of continuous stream temperature logger sites maintained by NJDFW in 2015 on recreationally important trout-stocked streams.

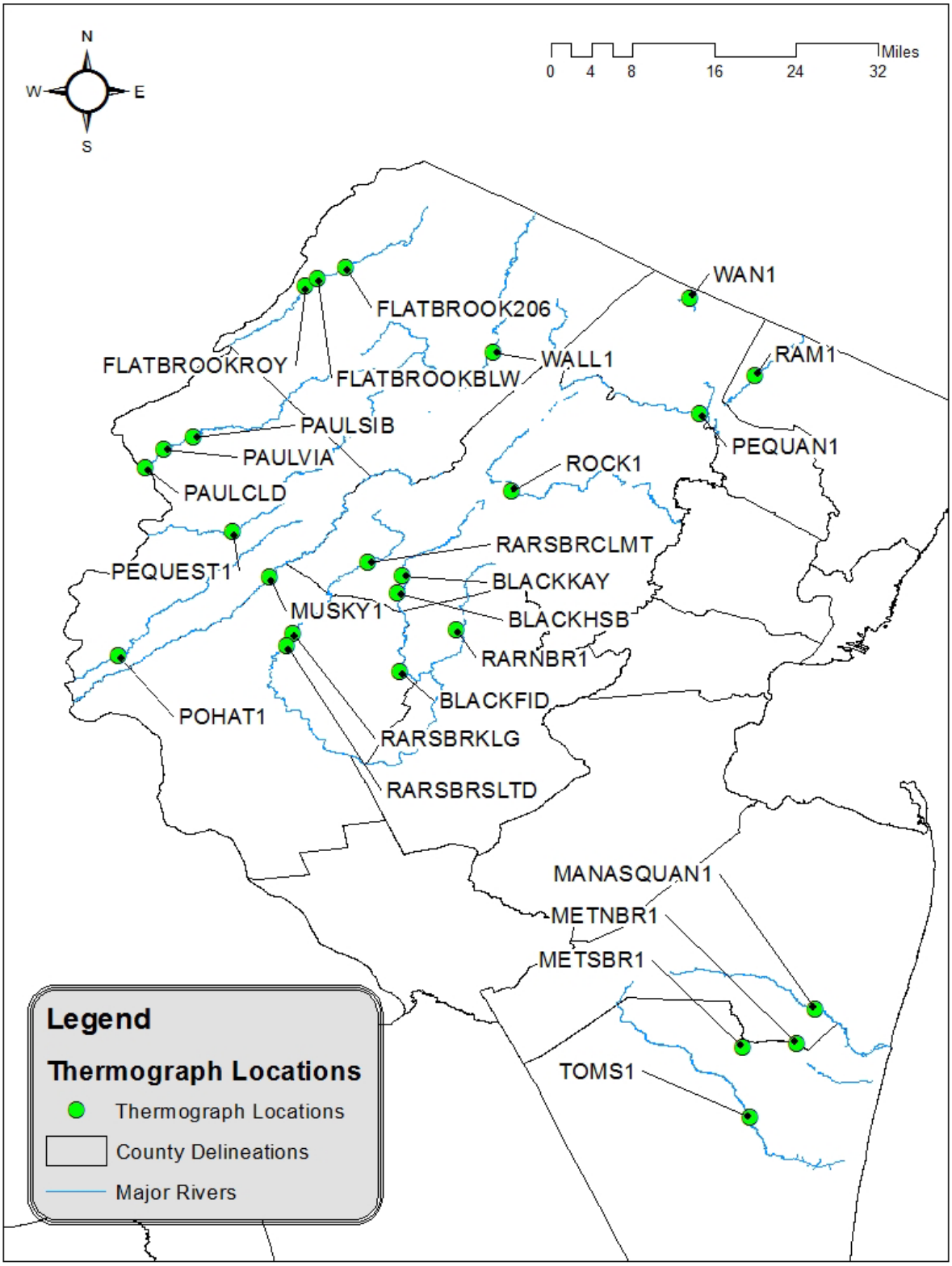


Table 1: 2015 NJDFW stream temperature monitoring network on recreationally important trout-stocked streams.

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

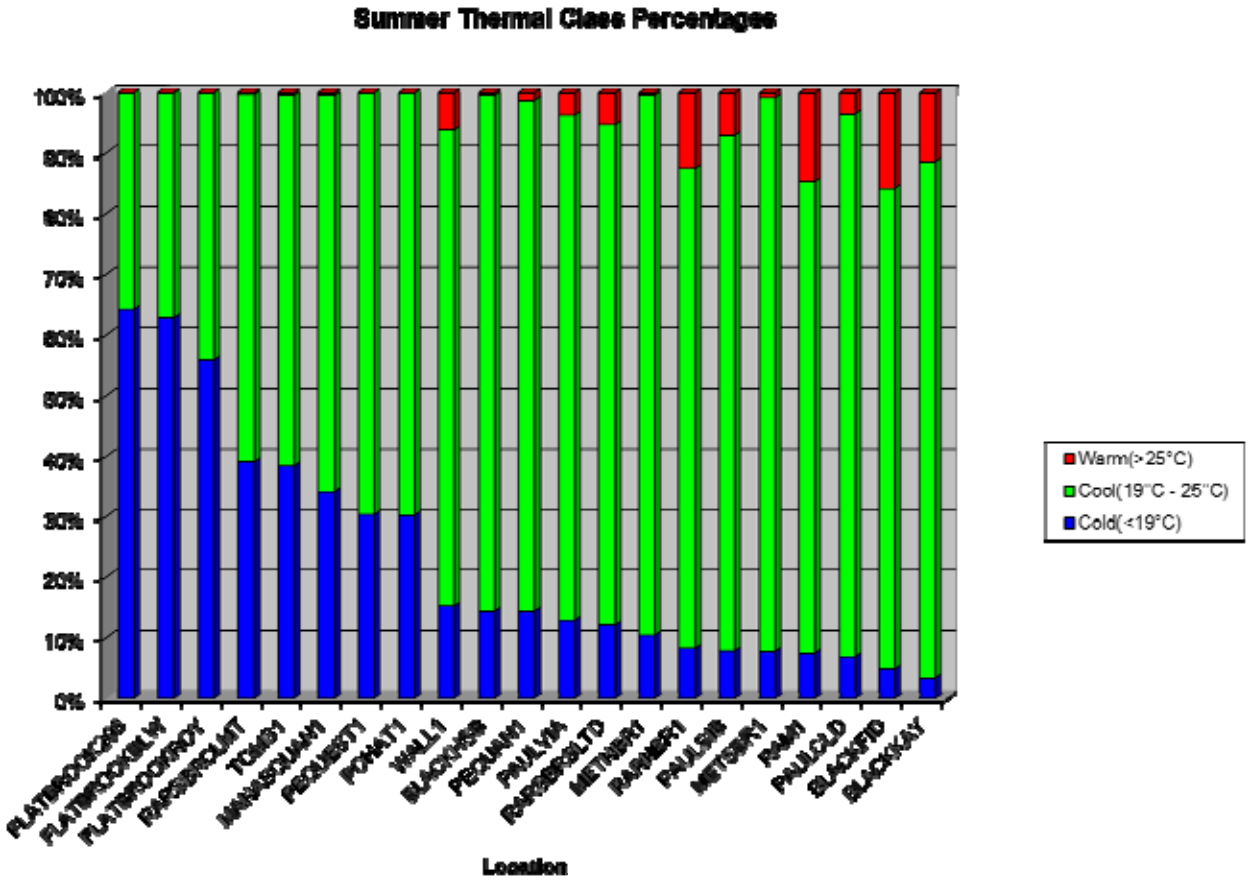
* Thermograph lost in 2014 and not replaced in 2015. Location will be monitored in 2016.
** Thermograph lost in 2015
*** Error in installation or launching resulted in unreliable data

Thermal Classification

Identifying the thermal classification of a stream is a useful tool in giving a basic understanding of the thermal regime of a stream. Figure 2 show the proportion of all summer (June 1 to August 31) stream temperature records above 25°C (warm-water), between 19-25°C (cool-water), and below 19°C (cold-water).

Sites on the Flat Brook/Big Flat Brook, the Claremont section of the South Branch of the Raritan River, and Toms River had the highest percentages (38.4 – 68.3%) of cold temperatures (<19°C) throughout summer while the sites on the Black River, Paulins Kill, and Ramapo River had the lowest percentage of cold temperatures (3.4 – 7.4%). Sites that had the highest percentage of warm temperatures (>25°C) throughout summer were located on the Black River, Ramapo River, and North Branch of the Raritan River (12.5 – 15.8%).

Figure 2: Proportion of 2015 summer stream temperatures that fit into each thermal regime: warm, cool, and cold.



Trout Production Streams

New Jersey's Surface Water Quality Standards New Jersey Administrative Code (N.J.A.C.) 7:9B states that for waters classified as FW-TP "temperatures shall not exceed a daily maximum of 22 degrees Celsius or rolling seven-day average of the daily maximum of 19 degrees Celsius, unless due to natural conditions." In Figure 3, the seven-day rolling average of the daily maximum temperature for three sites classified as FW-TP (sites with paired thermographs excluded) was compared against the FW-TP criteria for each week of summer. The results indicate that weekly average maximum temperatures at the TP sites exceeded the FW-TP standard for a seven-day rolling average of stream temperature over 95% of the summer time period at each site (Table 2).

Figure 3: Weekly average of the daily average maximum temperature for each FW2-TP site during summer weeks encompassing June 1 to August 31, 204. The red horizontal line indicates the "FW-TP" criteria that Trout Production streams should not exceed when observing their seven-day rolling average of daily average max temperature.

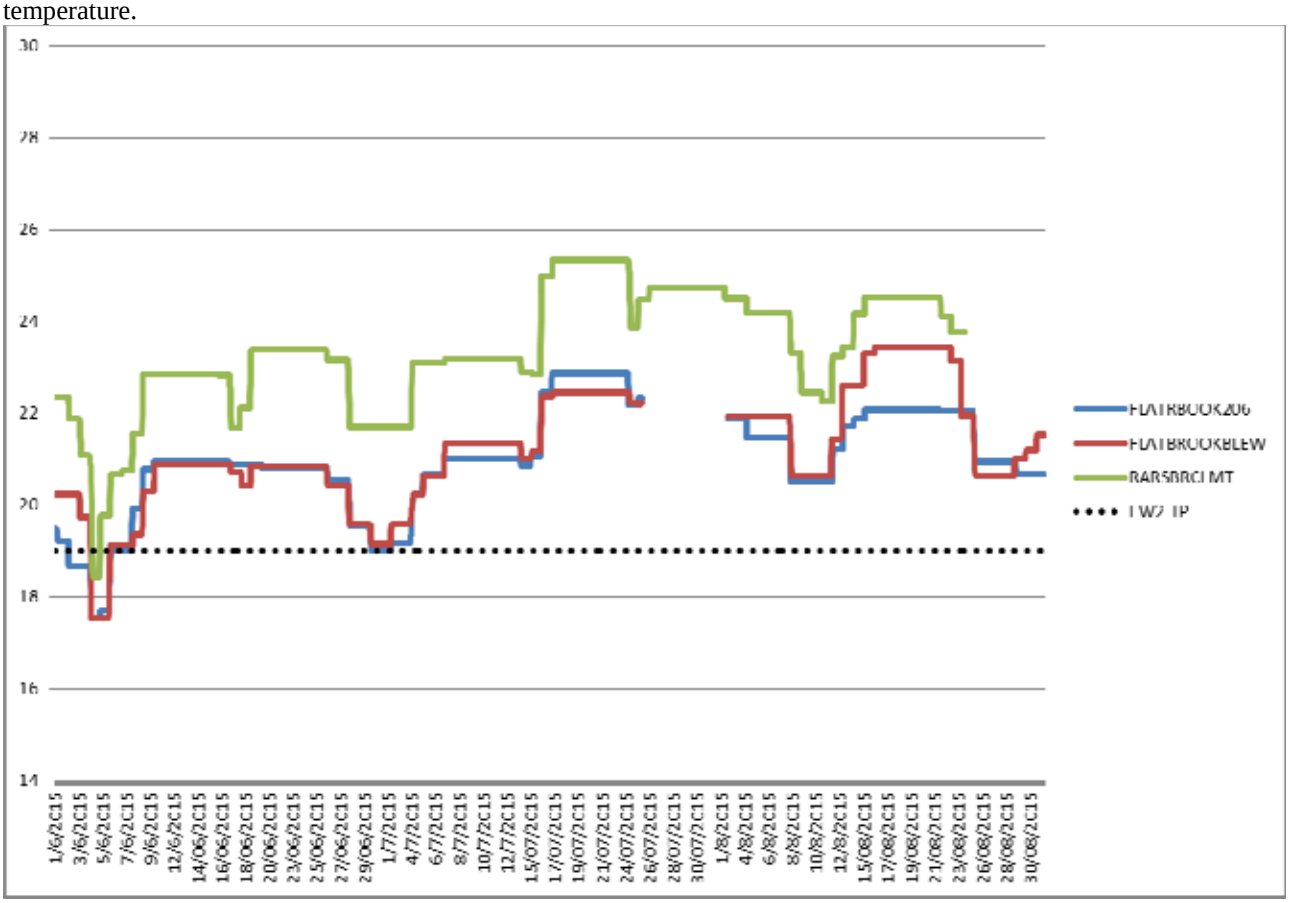


Table 2: Weekly average of the daily average maximum temperature for each FW2-TP site during summer weeks encompassing June 1 to August 31. Temperatures in red exceed the Surface Water Quality Standard criteria (FW2-TP) for a seven-day rolling average of stream temperature.

Site Name			
	BLACKFID	**BLACKHSB**	**BLACKKAY**
Percent of 7-day rolling average over 19	95.31	97.79	99.19

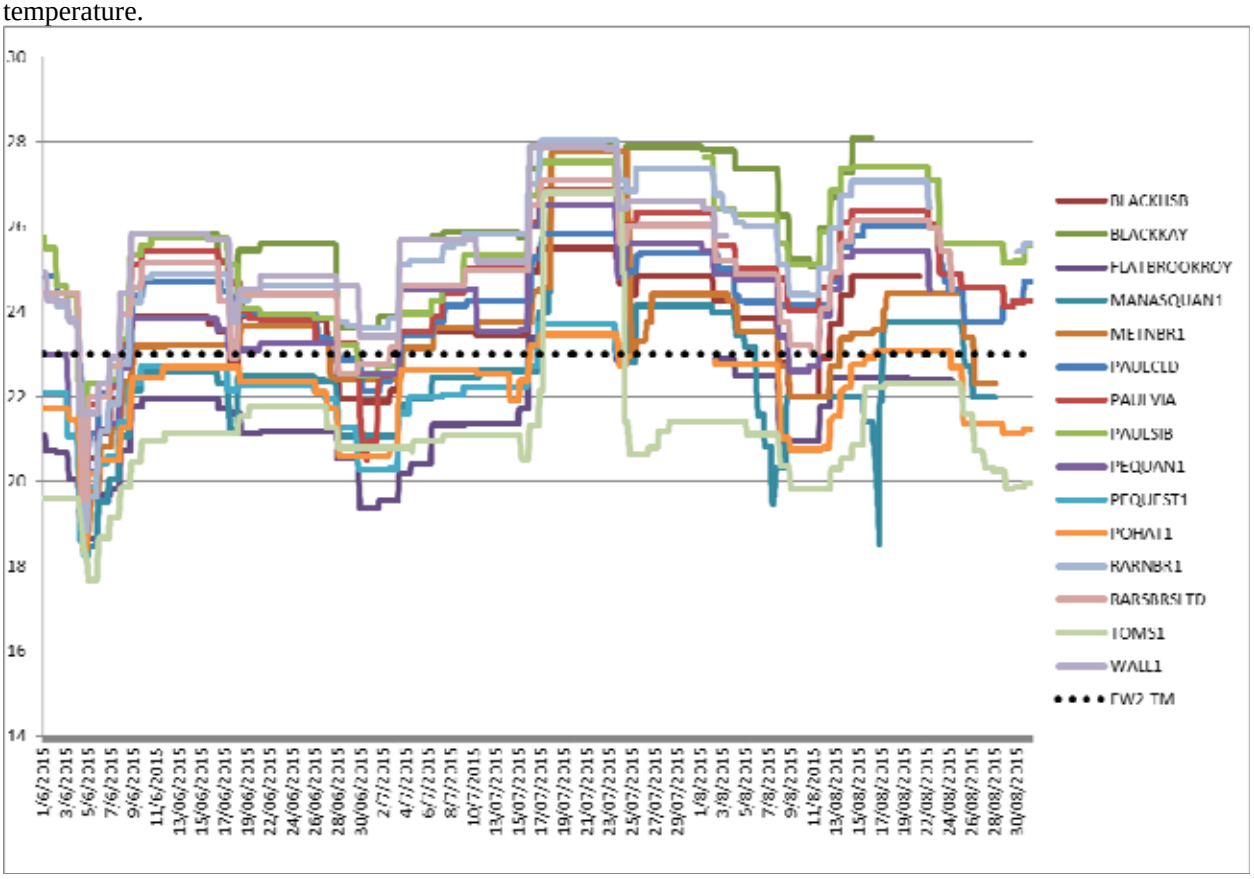
T**rout Maintenance Streams**

New Jersey's Surface Water Quality, Standards New Jersey Administrative Code (N.J.A.C.) 7:9B states that for waters classified as FW-TM "temperatures shall not exceed a daily maximum of 25 degrees Celsius or rolling seven-day average of the daily maximum of 23 degrees Celsius, unless due to natural conditions." In Figure 4, the seven-day rolling average of the daily maximum temperature for each site classified as FW-TM was compared against the FW-TM standard each week of summer. The results indicate that weekly average maximum temperatures at the TM sites are, more often than not, exceeding the FW-TM standard for a seven-day rolling average of stream temperature (Table 3). Some sites did not exceed the standard as often including, a site on the Flat Brook, Toms River, and Pequest River (all less than 13.63% of the time) but some sites may be cause for concern especially with a current classification that are, by definition, able to support trout year round. Two sites on the Black River, 3 sites on the Paulins Kill, and a site on the North Branch of the Raritan River all exceeded the TM temperature standard over 80% of the summer period.

Table 3: Percent of time that the seven-day rolling average of the daily maximum temperature for each site classified as FW-TM exceeded the Surface Water Quality Standard criteria of 23°C encompassing the time period of June 1 to August 31, 2015.

	BLACKHSB	BLACKKAY	FLAT-BROOKRO-Y	MANA-SQUA-N1	METNB-R1	PAULC-LD	PAULV-IA	PAULS-IB	PEQUA-N1	PEQUES-T1	POHA-T1	RARNB-R1	RAR-SBR-SLTD	TOMS1	WAL-L1
Percent of readings exceeding the FW-TM threshold	80.74	100.0	11.14	32.01	76.67	89.52	91.55	90.92	79.95	13.63	18.18	94.44	89.15	8.22	93.96

Figure 4: Seven-day rolling average of the daily average maximum temperature for each FW2-TM site during summer weeks encompassing June 1 to August 31, 2014. The black-dotted horizontal line indicates the "FW-TM" criteria that Trout Maintenance streams should not exceed when observing their seven-day rolling average of daily average max
temperature.



NonTrout Streams

New Jersey's Surface Water Quality, Standards New Jersey Administrative Code (N.J.A.C.) 7:9B states that for waters classified as FW-NT "temperatures shall not exceed a daily maximum of 31 degrees Celsius or rolling seven-day average of the daily maximum of 28 degrees Celsius, unless due to natural conditions." In Figure 5, the seven-day rolling average of the daily maximum temperature for each site classified as FW-NT was compared against the FW-NT standard each week of summer. The results showed that temperatures at the NT site on Black River exceeded the FW-NT standard 50% of the time and the Ramapo site exceeded the same standard 8% of the time (Table 4).

Figure 5: Weekly average of the daily average maximum temperature for each FW2-NT site during summer weeks encompassing June 1 to August 31, 2014. The red horizontal line indicates the "FW-NT" criteria that Non-Trout streams should not exceed when observing their seven-day rolling average of daily average max temperature.

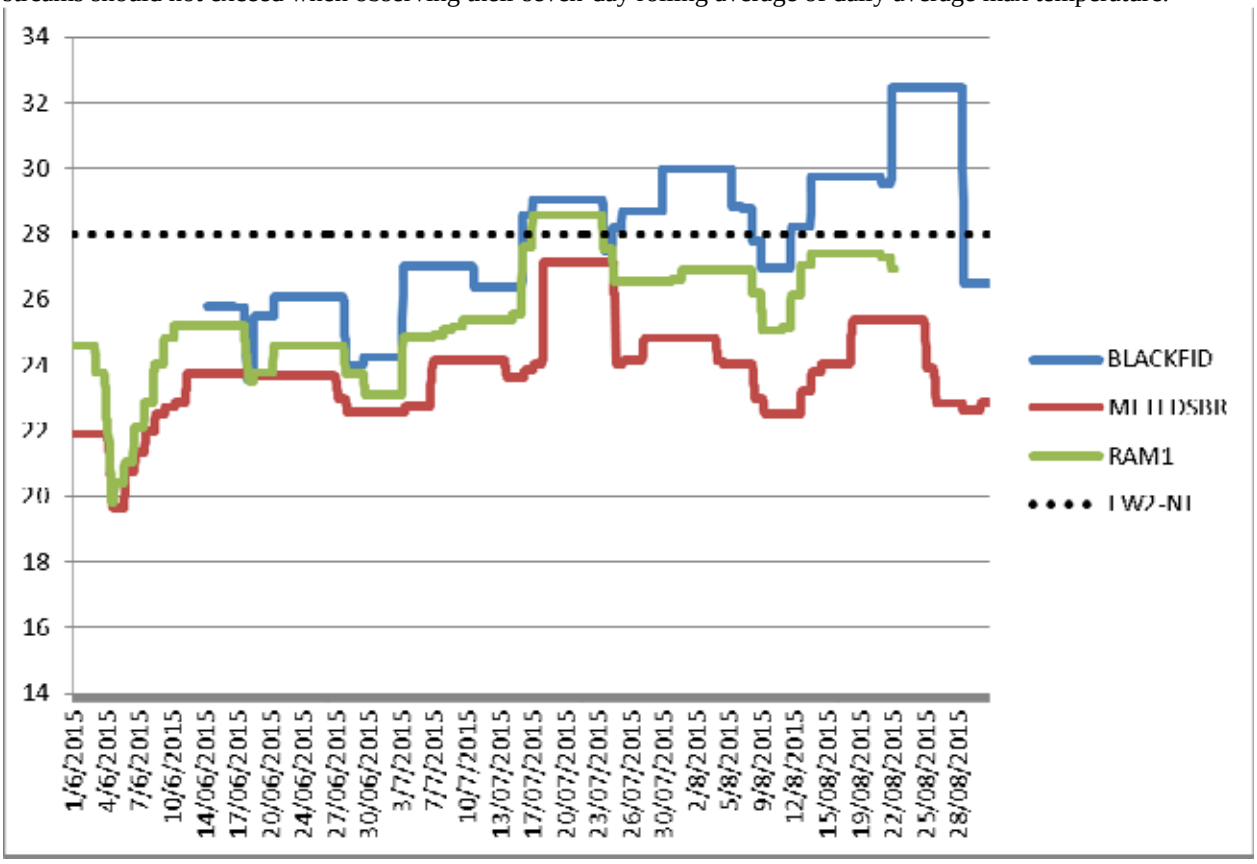


Table 4: Weekly average of the daily average maximum temperature for each FW2-NT site during summer weeks encompassing June 1 to August 31. Temperatures in red exceed the Surface Water Quality Standard criteria (FW2-NT) for a seven-day rolling average of stream temperature.

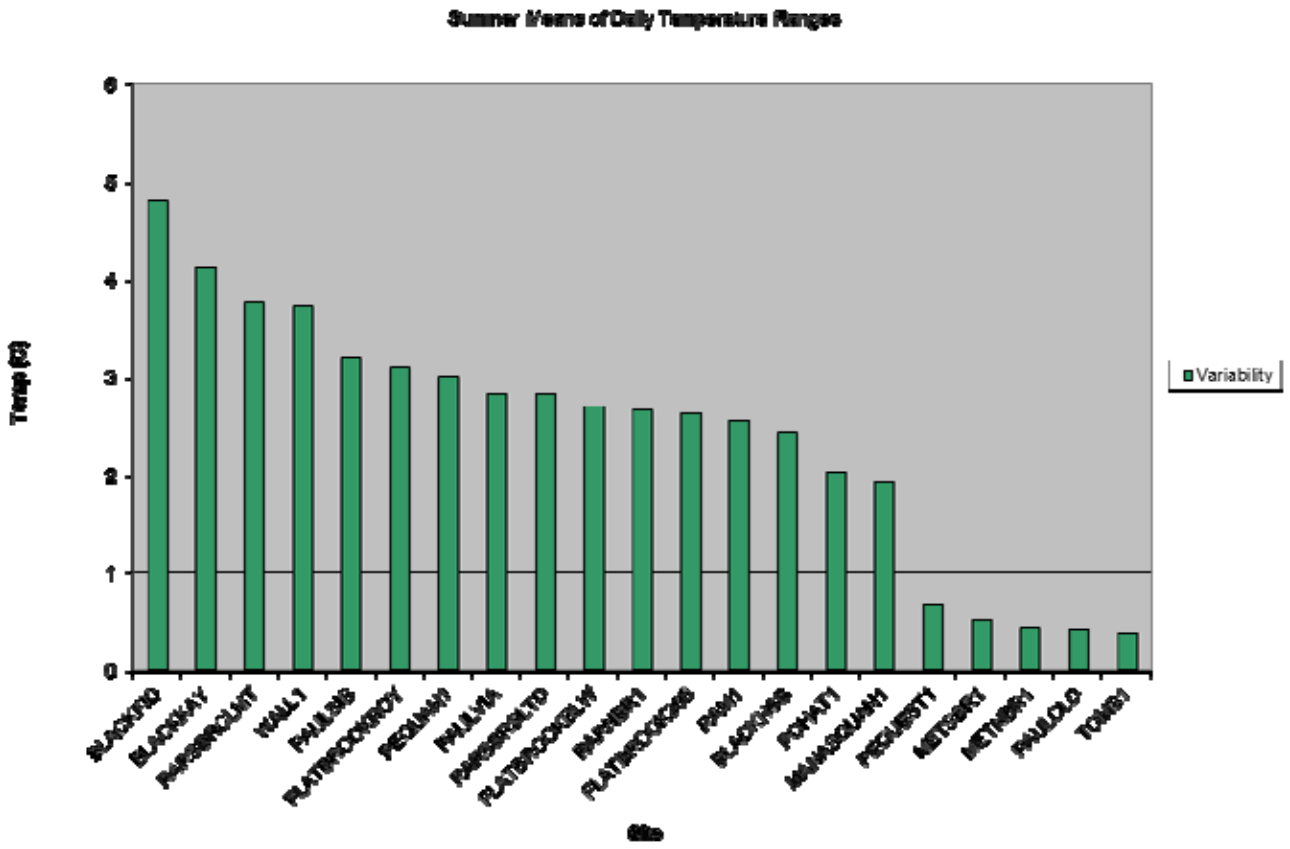
Site Name			
	BLACKFID	METEDSBR	RAM1
Percent of 7-day rolling average over 28	50.32	0	8.61

Daily and Seasonal Temperature Variability

Amplitude between daily and seasonal extreme values are useful in assessing the shape of daily and seasonal temperature change. Temperature variations at a given point in a stream may be related to two major sets of factors; (1) conditions at the sample location (velocity and discharge, season and hour, and the daily range of fluctuations of air temperatures) and (2) conditions upstream from the sample location (upstream environment, substrates, atmospheric conditions, temperatures, distance and time of flow from critical upstream situations).

Results of variability were calculated by determining the monthly mean of daily temperature maxima and minima. To determine summer daily temperature ranges, the monthly minima is subtracted from the monthly maxima for June, July, and August, and then the average is taken (Figure 6).

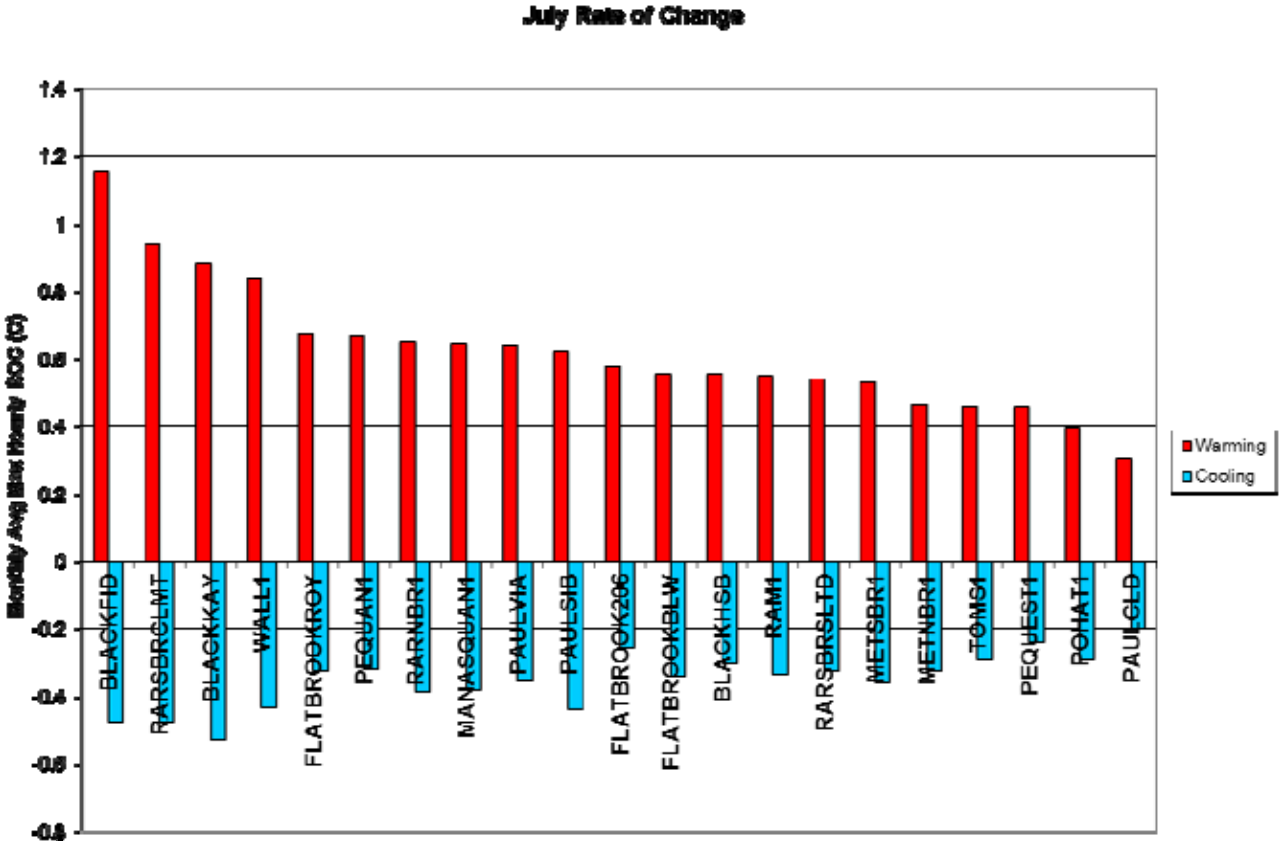
Figure 6: Average summer variability for each site in 2015.



Rate of Temperature Change

Large and sudden changes in temperature can lead to thermal shock in aquatic biota. Sub-lethal effects have been noted for smaller rates of change such as physiological stress leading to metabolic dysfunction, growth inhibition, and disease initiation. For the 25 sites monitored in 2015, July rates of change were calculated (Figure 7) by determining the maximum warming and cooling hourly rates of change for each day. These daily extreme hourly rates of change are then averaged for each month.

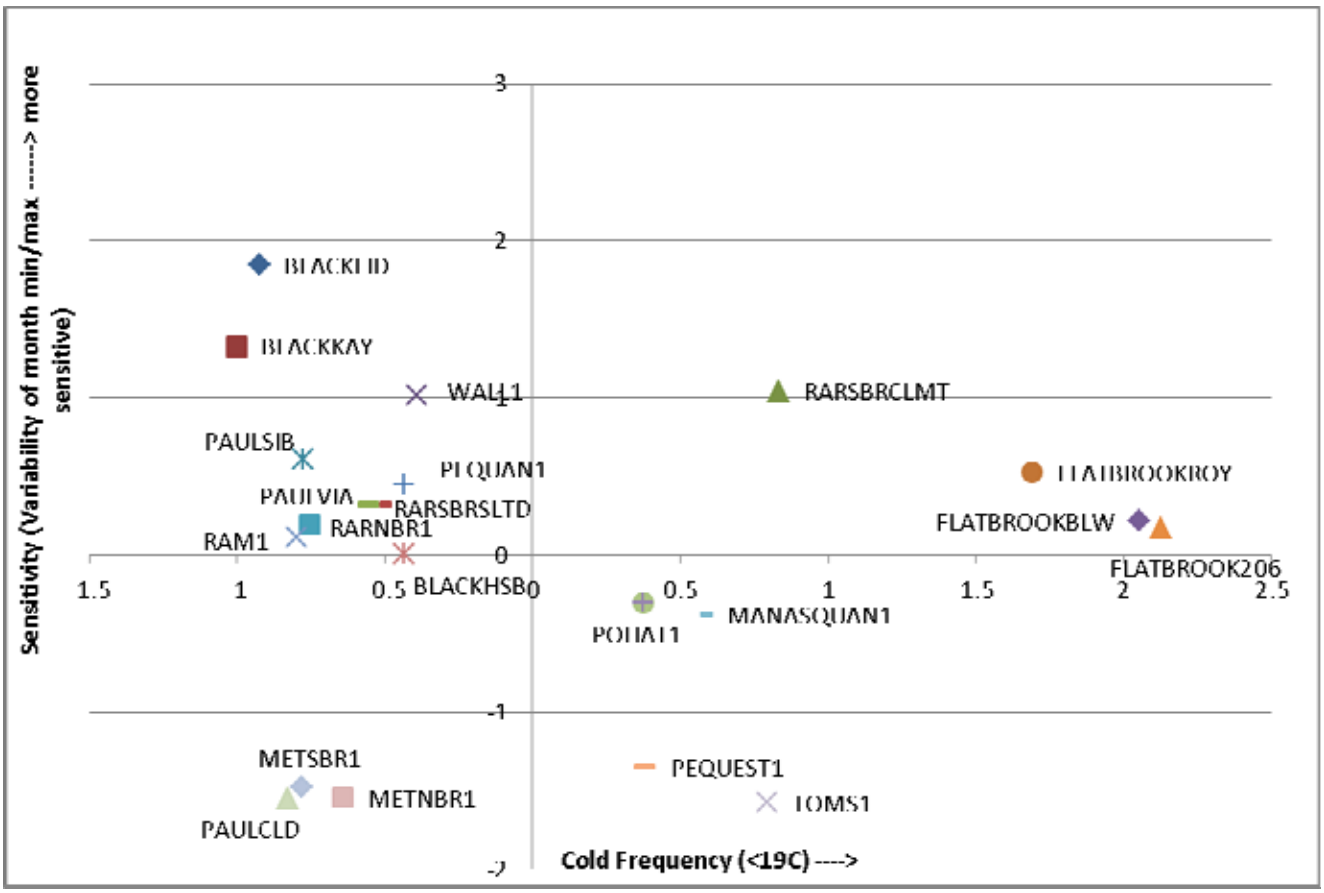
Figure 7: The warming and cooling rate of change for the month of July 2015 for each site.



Study Site Rankings

Based on proportion of time that the study sites were cold (<19°C) and the variability parameter, the sites were plotted to help classify which sites are most sensitive to stream temperature fluctuations and which sites are colder in general (Figure 8). Both parameters were standardized to enable an easier comparison ((x-mean)/SD). Ranking our sites based on sensitivity and cold frequency enables us to determine the best sites for trout habitat in general. With this information, we can alter trout stocking schedules and locations, prioritize habitat restoration projects, or compliment a variety of other projects that helps the Bureau of Freshwater Fisheries create better opportunities for our anglers.

Figure 8: Ranking system based on sensitivity and proportion of time streams are cold (<19°C). Sites that are coldest and least sensitive will tend gravitate to the bottom right of the graph and sites that are warmer and most sensitive will gravitate to the top left.



Summary

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. 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 (Figures 3 and 4). 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 the Division's trout stocking program is that the trout will simply not reside close to their stocking points. This isn't 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 warm up 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 the Pequannock River, South Branch of the Raritan River, and the Pohatcong Creek 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.

The development of the stream temperature monitoring program in New Jersey was intended to document stream temperatures in marginal trout habitat and use it as a tool to study the short and long term fluctuations in these popular waterbodies. The monitoring network has continued to expand every year. After 2-3 years of monitoring at a stream site, most of the useful information on that site and understanding the thermal patterns has already been done. It is useful to have permanent sites for long term monitoring (as these are rare), but effort may be shifted in the near future to develop predictive temperature models that will enable the Division to be prepared for future stream temperature scenarios.

Acknowledgements

Funding for this ongoing study is provided through the Federal Aid in Sport Fish Restoration Program (Grant F-48-R) administered through the New Jersey Division of Fish and Wildlife and through the sale of New Jersey freshwater fishing licenses and trout stamps.

New Jersey Coolwater Assessment Program Report (2015)

Investigations and Management of New Jersey's Freshwater Fisheries Resources (APPENDIX G)

By
Scott Collenburg, Assistant Fisheries Biologist

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

Sportfish Restoration Grant F-48-R

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

NEW JERSEY COOLWATER ASSESSMENT PROGRAM - 2015

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). 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 (Furnace Lake, Mountain Lake, and Carnegie 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, Pompton Lake, Lake Hopatcong, and Monksville Reservoir) were selected for spring trap netting surveys to assess one or more species (Northern Pike/Muskellunge/Walleye).

In 2015 seven waterbodies were sampled (Spruce Run Reservoir, Manasquan Reservoir, Furnace Lake, Mercer Lake, Monksville Reservoir, Swartswood Lake, and Canistear Reservoir). Trap net sampling for muskies and pike (which was 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. A total of 73 trap nets, 9 overnight gill nets, and 5 nights of boat electrofishing were utilized to capture the target species of interest from each waterbody.

SPRUCE RUN RESERVOIR

Location: Hunterdon County, Clinton, NJ
Drainage: Raritan River, South Branch
Target Species: Northern Pike

Acres: 1,290
Avg Depth: 26 ft
Max Depth: 73 ft

Methods

A total of sixteen South Dakota trap nets were set on Spruce Run Reservoir April 6 – 10 to capture Northern Pike. Four trap nets were set daily in water depths ranging from 3.5 to 6 ft and allowed to fish for 24 hours. Sample sites were selected based on historical sites and diversity of habitat. Once the nets were checked and tended, they were either relocated to different random sites to ensure all suitable habitats are sampled, or kept in the same location to obtain a larger sample size of the target species. Captured Northern Pike were measured for total length and weight, and scales were collected for growth analysis and age. Other fish species were measured for total length and weight, and/or counted for presence.

Biological Data

A total of 1,197 fish were captured in trap nets (Table 1). Yellow Perch, Bluegill, Alewife, and Black Crappie were the four most abundant species sampled in the trap nets (Table 1). A total of 14 species of fish were collected during the 2015 trap net survey at Spruce Run Reservoir. Catch of Northern Pike was good (CPUE of 5.1 fish/net), with a total of 82 Northern Pike captured, ranging in size 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 fish exceeding the keeper size of 24 in and 27 fish exceeding a quality size

of 30 inches (Table 1). The condition of Northern Pike was measured using the relative weight metric (W_r). The overall mean W_r for Northern Pike collected was 93 ± 3 and ranged from 67 – 122 which indicates slightly below average conditions (Table 2). The reason for below average condition is indicative of sampling the population in the middle of spawn. The Northern Pike population here appears abundant, healthy, and well balanced (Figure 1).

Trap netting is typically not a successful sampling technique for Largemouth Bass populations (Largemouth Bass have "net fear"). The CPUE for bass was 0.3 fish/net, and when compared to past sampling yields of 1-2 bass/net on other waterbodies in New Jersey, the Largemouth Bass population in this reservoir appears to be below average (Table 1).

Trap netting revealed a good population of Black Crappie (CPUE of 7.2 fish/net). Many large individuals composed the sample (PSD 95, RSD_p 92, and RSD_m 65) with 62 of the 104 measured individuals exceeding 12 inches in length! Despite the gear bias to capture larger Black Crappie, the abundance and sizes are considered large relative to other lakes sampled with Black Crappie populations in New Jersey. Not many smaller Black Crappie were captured as shown by the length-frequency graph (Figure 2), but this is not a concern as smaller individuals are not typically captured in trap nets.

The Yellow Perch and Bluegill populations here are abundant with a CPUE of 29 fish/net and 21.4 fish/net respectively (Table 1). However, PSD was low for both species and indicates populations stunted and out of balance (Table 1). The length-frequency graph for Yellow Perch shows most individuals are between 125-149 mm (5 – 5.9 in) in length (Figure 3). To gain more insight into what management strategies need to be taken to balance the Yellow Perch and Bluegill populations it is recommended their populations be investigated further by boat electrofishing.

Proportional Stock Density (PSD) of all species captured was on the higher end of their accepted ranges (Table 1) and part of this may be due to trap net bias. For instance, Laarman and Ryckman (1982) showed that trap nets were selective for larger sizes of Rock Bass, Walleye, Black Crappie, Bluegill, Yellow Perch, and Pumpkinseed. Being aware of these biases and interpreting them based upon the knowledge of these biases is appropriate. All gear used in collection of fisheries data can have their own bias. Even the method of collection can create a bias to alter what we perceive is the current condition of a fishery, verses what's actually present.

Spruce Run Reservoir also has a Hybrid Striped Bass fishery. To collect information and determine the status of this fishery, five 120 ft experimental gill nets were set October 14 - 15. A total of 47 Hybrid Striped Bass were captured representing all size ranges (Figure 4), but most were larger individuals as indicated by the PSD 93, RSD_p 64, and RSD_m 18. The Hybrid Striped Bass fishery in this reservoir appears to be healthy and stable.

Management Recommendations

1. Management recommendation for Northern Pike and Hybrid Striped Bass will be made at project completion.
2. Sample the Largemouth Bass population using a boat electrofishing unit.

Table 1. Catch per unit effort (CPUE) and stock density indices for Spring Trap Netting on Spruce Run Reservoir in 2015.

Species	Total Number Caught	% of Captured	Nets Set	CPUE (Fish/ Net)	PSD	95% CI (+/-)	RSD_p	RSD_m
Largemouth Bass	5	0.4	16	0.3	100	21	80	0
Bluegill	342	28.6	16	21.4	8	6	0	0
Yellow Perch	464	38.8	16	29.0	0	1	0	0
Black Crappie	115	9.6	16	7.2	95	5	92	65
White Perch	26	2.2	16	1.6	88	17	27	8
Northern Pike	82	6.9	16	5.1	96	6	26	2
Yellow Bullhead	3	0.3	16	0.2	-	-	-	-
White Catfish	6	0.5	16	0.4	-	-	-	-
Golden Shiner	3	0.3	16	0.2	-	-	-	-
Alewife	127	10.6	16	7.9	-	-	-	-
Spottail Shiner	7	0.6	16	0.4	-	-	-	-
White Sucker	1	0.1	16	0.1	-	-	-	-
Common Carp	3	0.3	16	0.2	-	-	-	-
American Eel	13	1.1	16	0.8	-	-	-	-
Total	**1197**	100						

Table 2. Condition of fish species captured on Spruce Run Reservoir in 2015 indicated by Relative Weight (W_r) index. Relative Weight quantifies fish condition based on how much a fish weighs for its length. A W_r of 95-105 is a typical objective for most species. Values well below 100 for a size group may be indicative of a problem in food and feeding relationships, and values well above 100 for a size group may be indicative of fish not making the best use of available prey.

Species	Range (mm)	Number	Avg W_r	95% CI (+/-)	SE	Range (mm)	
						Min	Max
Largemouth Bass	ALL ≥ 200	5	100	7	3.72827	91	111
	200-299	0	-	-	-	-	-
	300-379	1	94	-	-	-	-
	380-509	4	102	-	-	-	-
	≥ 510	0	-	-	-	-	-
Bluegill Sunfish	ALL ≥ 80	110	99	5	2.58084	57	200
	80-149	101	101	-	-	-	-
	150-199	9	79	-	-	-	-
	200-249	0	-	-	-	-	-
	≥ 250	0	-	-	-	-	-
Yellow Perch	ALL ≥ 130	90	76	4	1.898829	38	164
	130-199	90	76	-	-	-	-
	200-249	0	-	-	-	-	-
	250-299	0	-	-	-	-	-
	≥ 300	0	-	-	-	-	-
Black Crappie	ALL ≥ 130	103	98	2	0.820568	73	128
	130-199	5	105	-	-	-	-
	200-249	3	99	-	-	-	-
	250-299	28	98	-	-	-	-
	≥ 300	67	97	-	-	-	-
White Perch	ALL ≥ 130	26	88	5	2.609643	61	119
	130-199	3	66	-	-	-	-
	200-249	16	93	-	-	-	-
	250-299	5	83	-	-	-	-
	≥ 300	2	98	-	-	-	-
Northern Pike	ALL ≥ 350	81	93	3	1.311911	67	122
	350-529	3	93	-	-	-	-
	530-709	57	91	-	-	-	-
	710-859	19	97	-	-	-	-
	≥ 860	2	117	-	-	-	-

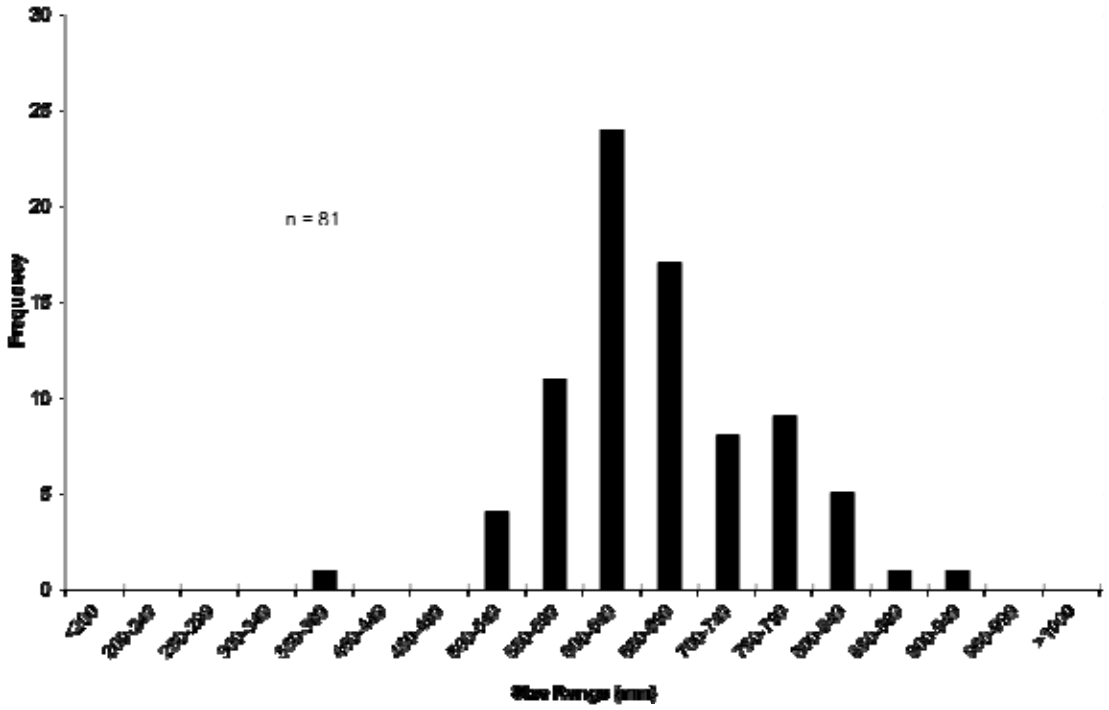


Figure 1. Length-frequency histogram of Northern Pike from spring trap netting Spruce Run Reservoir (2015).

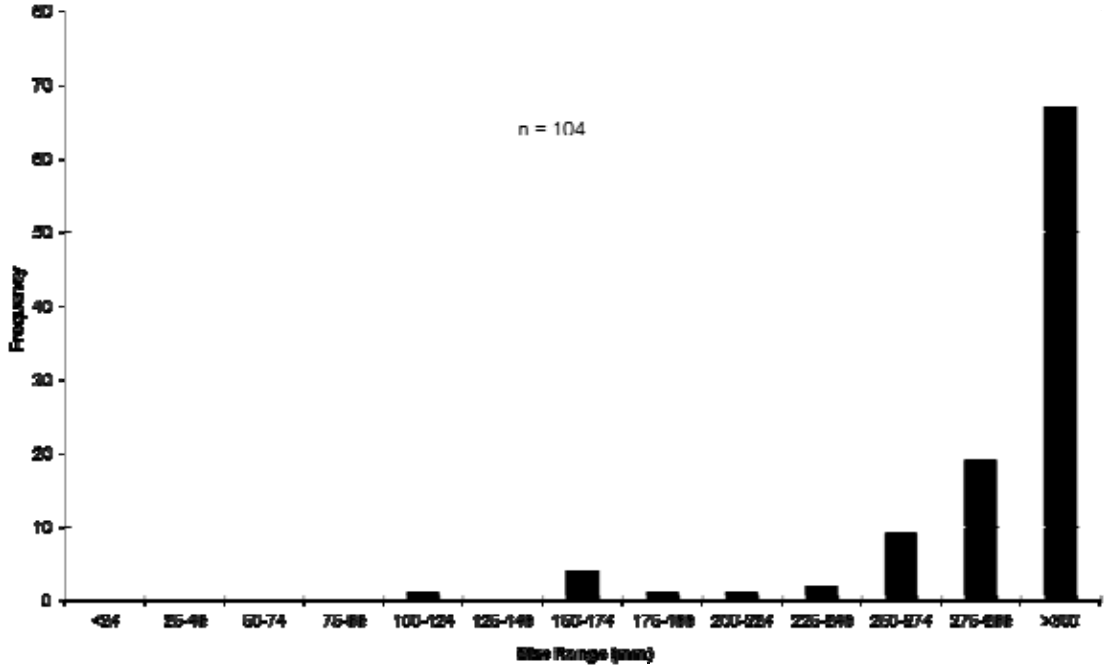


Figure 2. Length-frequency histogram of Black Crappie from spring trap netting Spruce Run Reservoir (2015).

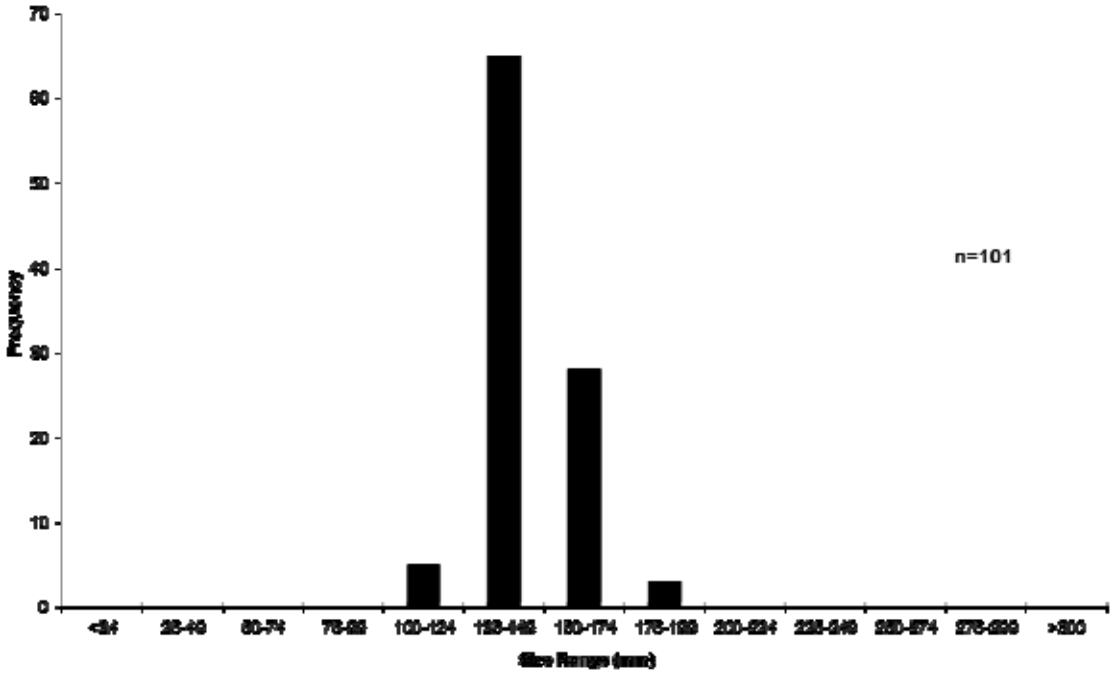


Figure 3. Length-frequency histogram of Yellow Perch from spring trap netting Spruce Run Reservoir (2015).

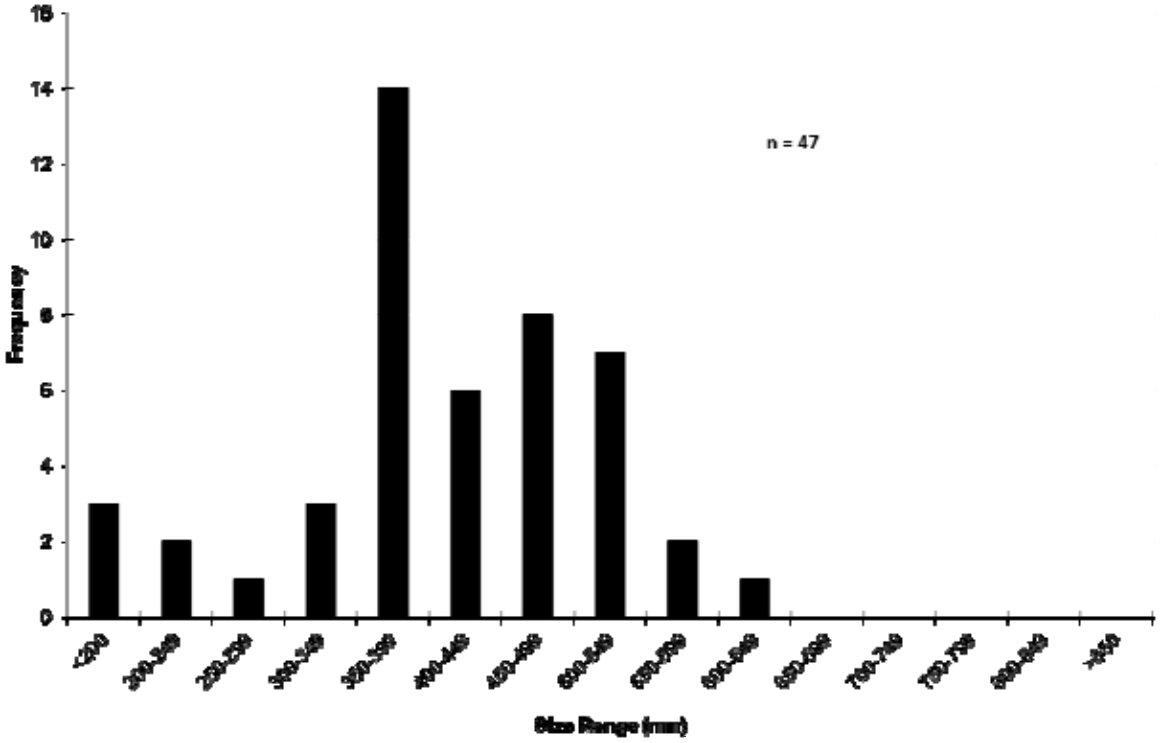


Figure 4. Length-frequency histogram of Hybrid Striped Bass from fall gill netting Spruce Run Reservoir (2015).

MANASQUAN RESERVOIR

Location: Monmouth County, Howell Township, NJ
Drainage: Manasquan River
Target Species: Muskellunge

Acres: 720
Avg Depth: 16 ft
Max Depth: 32 ft

Methods

A total of sixteen South Dakota trap nets were set on Manasquan Reservoir between April 6 and April 10. Four trap nets were set daily in water depths ranging from 3.5 to 8 ft deep and allowed to fish for 24 hours. Sample sites were selected based on historical sites and diversity of habitat. Once the nets are checked and tended, they're either relocated to different random sites to ensure all suitable habitats were sampled, or kept in the same location to obtain a larger sample size of the target species. Captured Muskellunge were measured for total length and weight, and scales were collected for growth analysis and age. Other fish species were measured for total length and weight, and/or counted for presence.

Biological Data

A total of 3,815 fish were captured in trap nets. White Perch and Bluegill cumulatively composed 94% of the catch (Table 3). A total of 13 species of fish were collected, but catch of the target species, Muskellunge, was low, with only one individual captured (CPUE of 0.1fish/net). The Muskellunge was large at 963 mm (38 in) and weighed 8 kg (17.6 lb). Manasquan Reservoir proved to be a difficult waterbody to sample as it lacks a variety of points and inlets that trap nets are usually set and have proven to be effective places to capture Muskellunge. Anglers and Monmouth County Park employees provided anecdotal evidence of anglers catching Muskellunge but this species does not seem to be specifically targeted by many anglers. Another method of sampling or more trap netting may be needed to better understand the Muskellunge fishery in this reservoir.

Trap netting revealed an abundant population of White Perch with a CPUE of 106.1 fish/net (Table 3). The White Perch population is dominated by larger individuals with a PSD of 100, RSD_p of 58, and RSD_m of 22. Manasquan Reservoir offers great habitat and water quality for White Perch and is a reason why they thrive there. White Perch tend to form very large populations that can dominate the waters they inhabit because of their large reproductive potential in places that have favorable conditions (Smith 2002). This population should be closely monitored as White Perch populations have a tendency to achieve high abundances of individuals with small size structure. Currently, they provide great fishing opportunities.

A good number of Black Crappie were captured (CPUE of 7.6 fish/net). Many large individuals composed the population (PSD of 96, RSD_p of 94, and RSD_m of 65), with 45 of 83 measured individuals exceeding 12 inches in length! Despite there being a trap net bias to capture larger Black Crappie, the abundance and sizes are large relative to other New Jersey lakes sampled that have Black Crappie populations. Not many smaller Black Crappie were captured as shown by the length-frequency graph (Figure 5), but this is not a concern as smaller individuals typically are not captured in trap nets.

Bluegill were also abundant with a CPUE of 117.1 fish/net but their condition was below average, indicated by an average relative weight (W_r) of 80 (Table 4). The reservoir's forage base is abundant. Chain Pickerel were commonly captured in trap nets as well (CPUE of 2.6 fish/net), and most were larger individuals with a PSD of 76 (Figure 6). This species should provide a lot of action for anglers fishing here. In addition, three Hybrid Striped Bass were captured in one of the trap nets. Trap nets are typically ineffective at capturing Hybrid Striped Bass and therefore were sampled in the fall of 2015 with gill nets. On October 21 - 22 a total of four 120 ft experimental gill nets (6 ft deep, with 4 panels of 2 – 5 in mesh sizes) were set. A total of 3 Hybrid Striped Bass were captured during this gill netting event. With this low catch rate more sampling is needed next fall to determine the status of this fishery.

Management Recommendations

1. Determine an effective method to sample the Muskellunge population as trap nets were not successful for this species.
2. Set gill nets in the fall of 2016 to assess the Hybrid Striped Bass population.

Table 3. Catch per unit effort (CPUE) and stock density indices for spring trap netting on Manasquan Reservoir in 2015.

Species	Total Number Caught	% of Captured	Nets Set	CPUE (Fish / Net)	PSD	95% CI (+/-)	RSD_p	RSD_m
Largemouth Bass	8	0.2	16	0.5	88	39	75	0
Chain Pickerel	41	1.1	16	2.6	76	17	17	5
Bluegill	1883	49.4	16	117.7	92	6	53	0
Pumpkinseed	5	0.1	16	0.3	-	-	-	-
Yellow Perch	36	0.9	16	2.3	93	21	7	0
Black Crappie	121	3.2	16	7.6	96	6	94	65
White Perch	1698	44.5	16	106.1	100	1	59	22
Brown Bullhead	10	0.3	16	0.6	100	26	-	-
Muskellunge	1	0.0	16	0.1	-	-	-	-
Hybrid Striped Bass	3	0.1	16	0.2	-	-	-	-
Channel Catfish	1	0.0	16	0.1	-	-	-	-
Golden Shiner	1	0.0	16	0.1	-	-	-	-
American Eel	6	0.2	16	0.4	-	-	-	-
Total	**3814**	100.0						

Table 4. Condition of fish species captured on Manasquan Reservoir in 2015 indicated by Relative Weight (W_r) index. Relative Weight quantifies fish condition based on how much a fish weighs for its length. A W_r of 95-105 is a typical objective for most species. Values well below 100 for a size group may be indicative of a problem in food and feeding relationships, and values well above 100 for a size group may be indicative of fish not making the best use of available prey.

Species	Range (mm)	Number	Avg W_r	95% CI (+/-)	SE	Range (mm)	
						Min	Max
Largemouth Bass	ALL ≥ 200	8	110	11	5.71964	77	130
	200-299	1	77	-	-	-	-
	300-379	1	127	-	-	-	-
	380-509	5	113	-	-	-	-
	≥ 510	1	105	-	-	-	-
Chain Pickerel	ALL ≥ 250	41	94	3	1.571042	75	118
	250-379	10	98	-	-	-	-
	380-509	24	94	-	-	-	-
	510-629	5	90	-	-	-	-
	≥ 630	2	86	-	-	-	-
Bluegill Sunfish	ALL ≥ 80	109	80	2	1.204315	36	133
	80-149	9	85	-	-	-	-
	150-199	42	79	-	-	-	-
	200-249	58	81	-	-	-	-
	≥ 250	0	-	-	-	-	-
Yellow Perch	ALL ≥ 130	15	69	6	3.089871	48	94
	130-199	1	94	-	-	-	-
	200-249	13	69	-	-	-	-
	250-299	1	54	-	-	-	-
	≥ 300	0	-	-	-	-	-
Black Crappie	ALL ≥ 130	82	100	2	0.894555	80	116
	130-199	3	94	-	-	-	-
	200-249	2	101	-	-	-	-
	250-299	24	103	-	-	-	-
	≥ 300	53	99	-	-	-	-
White Perch	ALL ≥ 130	100	90	2	0.808413	64	110
	130-199	0	-	-	-	-	-
	200-249	41	89	-	-	-	-
	250-299	37	89	-	-	-	-
	≥ 300	22	95	-	-	-	-
Muskellunge	ALL ≥ 510	1	111	-	-	111	111
	510-759	0	-	-	-	-	-
	760-969	1	111	-	-	-	-
	970-1069	0	-	-	-	-	-
	≥ 1070	0	-	-	-	-	-
Hybrid Striped Bass	ALL ≥ 200	3	89	3	1.527525	87	92
	200-299	0	-	-	-	-	-
	300-379	0	88	-	-	-	-
	380-509	0	-	-	-	-	-
	≥ 510	2	90	-	-	-	-

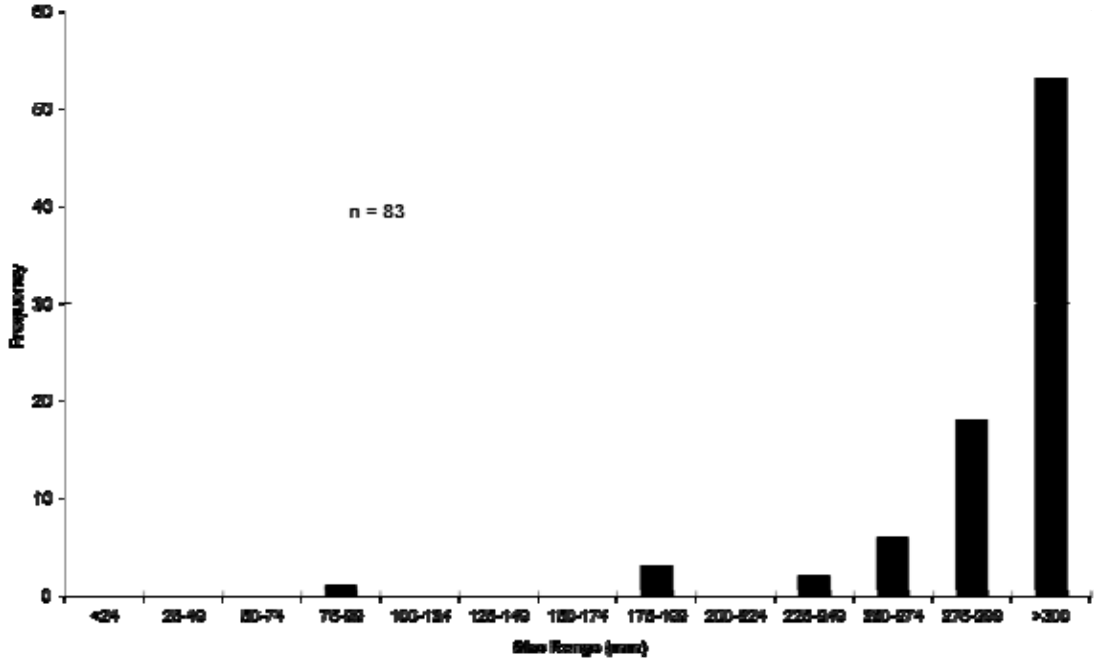


Figure 5. Length-frequency histogram of Black Crappie from spring trap netting Manasquan Reservoir (2015).

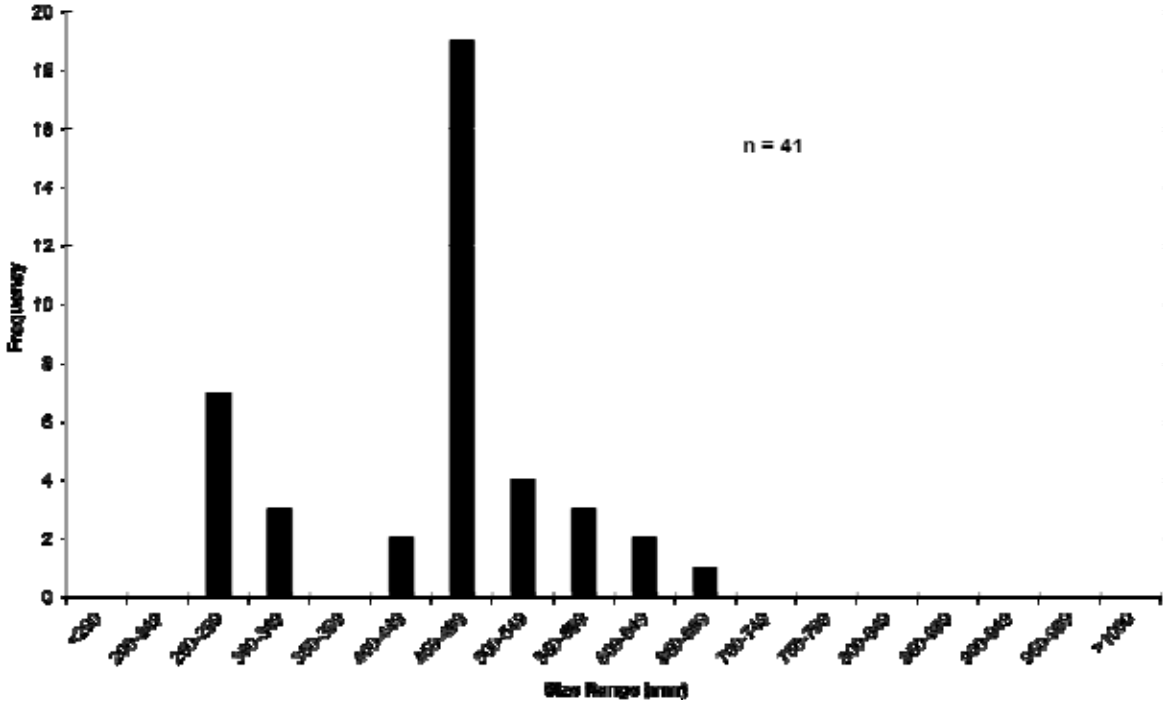


Figure 6. Length- frequency histogram of Chain Pickerel from spring trap netting Manasquan Reservoir (2015).

FURNACE LAKE

Location: Warren County, Oxford Township, NJ
Drainage: Pequest River
Target Species: Muskellunge, Tiger Muskellunge

Acres: 53
Avg Depth: 18 ft
Max Depth: 37 ft

Methods

A total of nine South Dakota trap nets were set on Furnace Lake April 21 - 24. Three trap nets were set daily in water depths ranging from 3.5 to 6 ft deep and allowed to fish for 24 hours. Sample sites were selected based on historical sites and diversity of habitat. Once the nets are checked and tended, they're either relocated to different random sites to ensure all suitable habitats were sampled, or kept in the same location to obtain a larger sample size of the target species. Captured Muskellunge were measured for total length and weight, and scales were collected for growth analysis and age. Other fish species were measured for total length and weight, and/or counted for presence.

Biological Data

A total of 4,337 fish were captured in trap nets. Bluegill Sunfish were by far the most common fish species present, composing 92.3% of the catch (Table 5). A total of twelve species of fish were collected during the 2015 trap net survey. Catch of the target species, Muskellunge and Tiger Muskellunge, was good, with an average of one individual captured for two nets set (CPUE of 0.44 fish/net). The Muskellunge were large at 1010 - 1061 mm (39.8 – 41.8 in) and weighed 9.8 – 11.5 kg (21.6 – 25.4 lb), as were the Tiger Muskellunge at 836 – 846 mm (32.9 – 33.3 in) and weighed 3.63 – 4.12 kg (8.0 – 9.1 lb). Furnace Lake is a small waterbody but is popular among Muskellunge anglers, which is not surprising since our catch rate here exceeds any other waterbody that we have sampled since the Coolwater Assessment was initiated in 2013.

The sunfish population was very abundant and should provide adequate forage for higher trophic level fish species. The CPUE for Bluegill was 445 fish/net and Pumpkinseed CPUE was 21.8 fish/net. PSD for both Bluegill and Pumpkinseed was 5, which is low and indicates a population composed of smaller individuals. Relative weight (W_r) is low for Bluegill (86) and Pumpkinseed (88) further indicating that there is a potential that the high abundance of both species are creating stress and competition for resources (Table 6). It would be interesting to investigate the bass population here via boat electrofishing to determine if stocking is necessary to help control and balance the sunfish population.

Management Recommendations

1. Recommendation for Muskellunge will be made at project completion.
2. Sample the bass population here via boat electrofishing.

Table 5. Catch per unit effort (CPUE) and stock density indices for spring trap netting on Furnace Lake in 2015.

Species	Total Number Caught	% of Captured	Nets Set	CPUE (Fish / Net)	PSD	95% CI (+/-)	RSD_p	RSD_m
Largemouth Bass	3	0.1	9	0.3	-	-	-	-
Bluegill	4005	92.4	9	445.0	5	6	0	0
Pumpkinseed	196	4.5	9	21.8	5	7	0	0
Yellow Perch	39	0.9	9	4.3	95	10	64	21
Black Crappie	10	0.2	9	1.1	100	10	100	90
Brown Bullhead	40	0.9	9	4.4	97	8	-	-
Rock Bass	2	0.0	9	0.2	-	-	-	-
Muskellunge	2	0.0	9	0.2	-	-	-	-
Tiger Muskellunge	2	0.0	9	0.2	-	-	-	-
Channel Catfish	4	0.1	9	0.4	-	-	-	-
Alewife	28	0.6	9	3.1	-	-	-	-
Rainbow Trout	5	0.1	9	0.6	-	-	-	-
Total	**4336**	100.0						

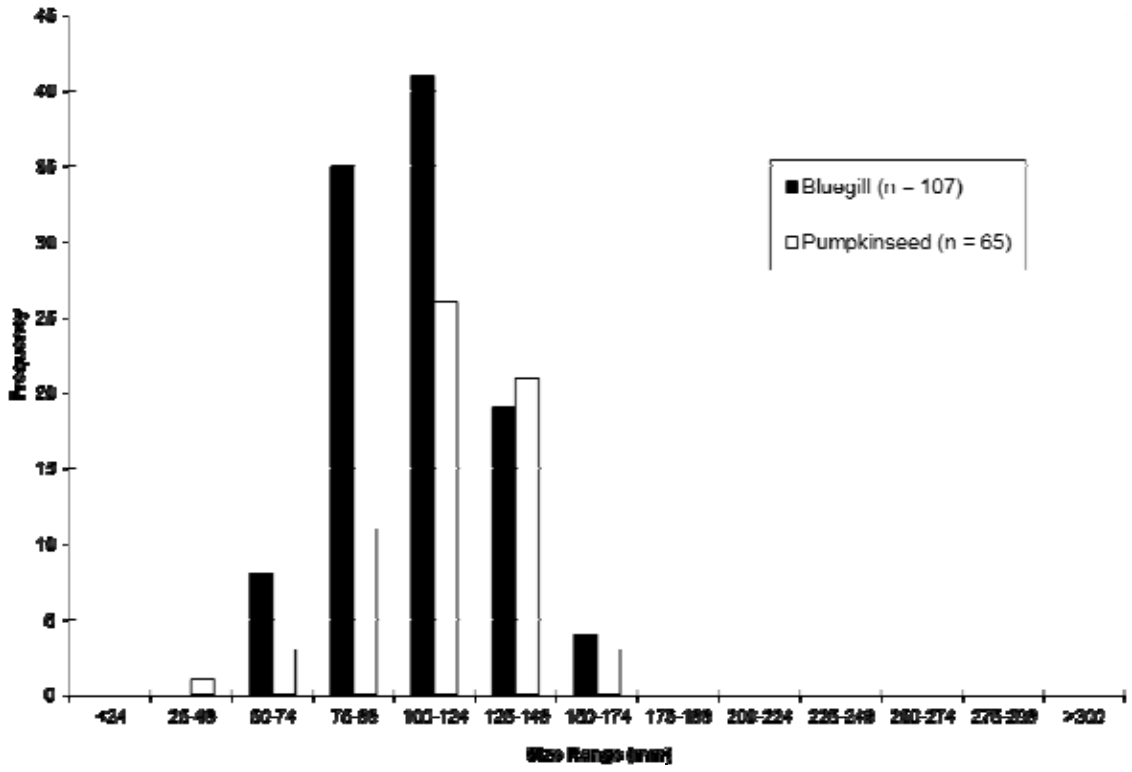


Figure 7. Length- frequency histogram of Bluegill and Pumpkinseed from spring trap netting Furnace Lake (2015).

Table 6. Condition of fish species captured on Furnace Lake in 2015 indicated by Relative Weight (W_r) index. Relative Weight quantifies fish condition based on how much a fish weighs for its length. A W_r of 95-105 is a typical objective for most species. Values well below 100 for a size group may be indicative of a problem in food and feeding relationships, and values well above 100 for a size group may be indicative of fish not making the best use of available prey.

Species	Range (mm)	Number	Avg W_r	95% CI (+/-)	SE	Range (mm)	
						Min	Max
Bluegill Sunfish	ALL ≥ 80	87	86	4	1.897717	36	142
	80-149	83	86	-	-	-	-
	150-199	4	88	-	-	-	-
	200-249	0	-	-	-	-	-
	≥ 250	0	-	-	-	-	-
Pumpkinseed Sunfish	ALL ≥ 80	61	88	3	1.693956	58	122
	80-149	58	87	-	-	-	-
	150-199	3	100	-	-	-	-
	200-249	0	-	-	-	-	-
	≥ 250	0	-	-	-	-	-
Yellow Perch	ALL ≥ 130	39	79	2	1.155973	65	96
	130-199	2	82	-	-	-	-
	200-249	12	84	-	-	-	-
	250-299	17	77	-	-	-	-
	≥ 300	8	75	-	-	-	-
Brown Bullhead	ALL ≥ 150	38	109	12	6.155255	84	324
	150-229	1	172	-	-	-	-
	≥ 230	37	102	-	-	-	-
Muskellunge	ALL ≥ 510	2	116	-	0	116	116
	510-759	0	-	-	-	-	-
	760-969	0	-	-	-	-	-
	970-1069	2	116	-	-	-	-
	≥ 1070	0	-	-	-	-	-
Tiger Muskellunge	ALL ≥ 510	2	90	7	3.5	86	93
	510-759	0	-	-	-	-	-
	760-969	2	90	-	-	-	-
	970-1069	0	-	-	-	-	-
	≥ 1070	0	-	-	-	-	-

MERCER LAKE

Location: Mercer County, West Windsor, NJ
Drainage: Assunpink Creek
Target Species: Muskellunge

Acres: 275
Avg Depth: 8 ft
Max Depth: 20 ft

Methods

A total of fifteen South Dakota trap nets were set on Mercer Lake between April 27 and May 1. Three to four trap nets were set daily in water depths ranging from 3.5 to 8 ft deep and allowed to fish for 24 hours. Sample sites were selected based on historical sites and diversity of habitat. Once the nets are checked and tended, they're either relocated to different random sites to ensure all suitable habitats were sampled, or kept in the same location to obtain a larger sample size of the target species. If Muskellunge were captured, they would be measured for total length and weight, and scales collected for growth analysis and age. Other fish species were measured for total length and weight, and/or counted for presence.

Biological Data

A total of 6,247 fish were captured in the trap nets. White Perch were, by far, the most common fish species present, composing 91.2% of the catch (Table 7). 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.

Trap netting revealed an abundant population of White Perch with a CPUE of 380 fish/net (Table 7). Similar to Manasquan Reservoir, which was also surveyed with trap nets in 2014, the White Perch population was very abundant. However, the White Perch population at Mercer Lake is dominated by smaller individuals indicated by a PSD of 5 and an RSD_p of 0 (Table 7, Figure 8). White Perch tend to form very large populations that can dominate the waters they inhabit because of their large reproductive potential in places that have favorable conditions (Smith 2002). White Perch populations have a tendency to achieve high abundances of individuals with small size structure and can become a nuisance. They're very aggressive feeders and a large portion of their diet can be fish eggs or smaller fish which can lead them to dominate waters they inhabit.

White Crappie and Black Crappie were both captured during this survey. Black Crappies were more abundant but the White Crappies seem to be reaching larger sizes with the largest at 393 mm (15.4 in) in length and 1.0 kg (2.2 lb).

Management Recommendations

1. Continue to investigate Muskellunge population via new sampling techniques or additional trap netting.
2. Determine appropriate action to control White Perch population that may be reaching nuisance levels.

Table 7. Catch per unit effort (CPUE) and stock density indices for spring trap netting on Mercer Lake in 2015.

Species	Total Number Caught	% of Captured	Nets Set	CPUE (Fish / Net)	PSD	95% CI (+/-)	RSD_p	RSD_m
Largemouth Bass	5	0.1	15	0.3	-	-	-	-
Yellow Perch	134	2.1	15	8.9	18	15	3	0
Black Crappie	52	0.8	15	3.5	-	-	-	-
White Crappie	15	0.2	15	1.0	100	8	62	62
White Perch	5700	91.2	15	380.0	5	6	0	0
Yellow Bullhead	48	0.8	15	3.2	-	-	-	-
Brown Bullhead	159	2.5	15	10.6	100	3	-	-
Channel Catfish	3	0.0	15	0.2	-	-	-	-
Gizzard Shad	123	2.0	15	8.2	-	-	-	-
Golden Shiner	1	0.0	15	0.1	-	-	-	-
Alewife	4	0.1	15	0.3	-	-	-	-
American Eel	3	0.0	15	0.2	-	-	-	-
Total	**6247**	100.0						

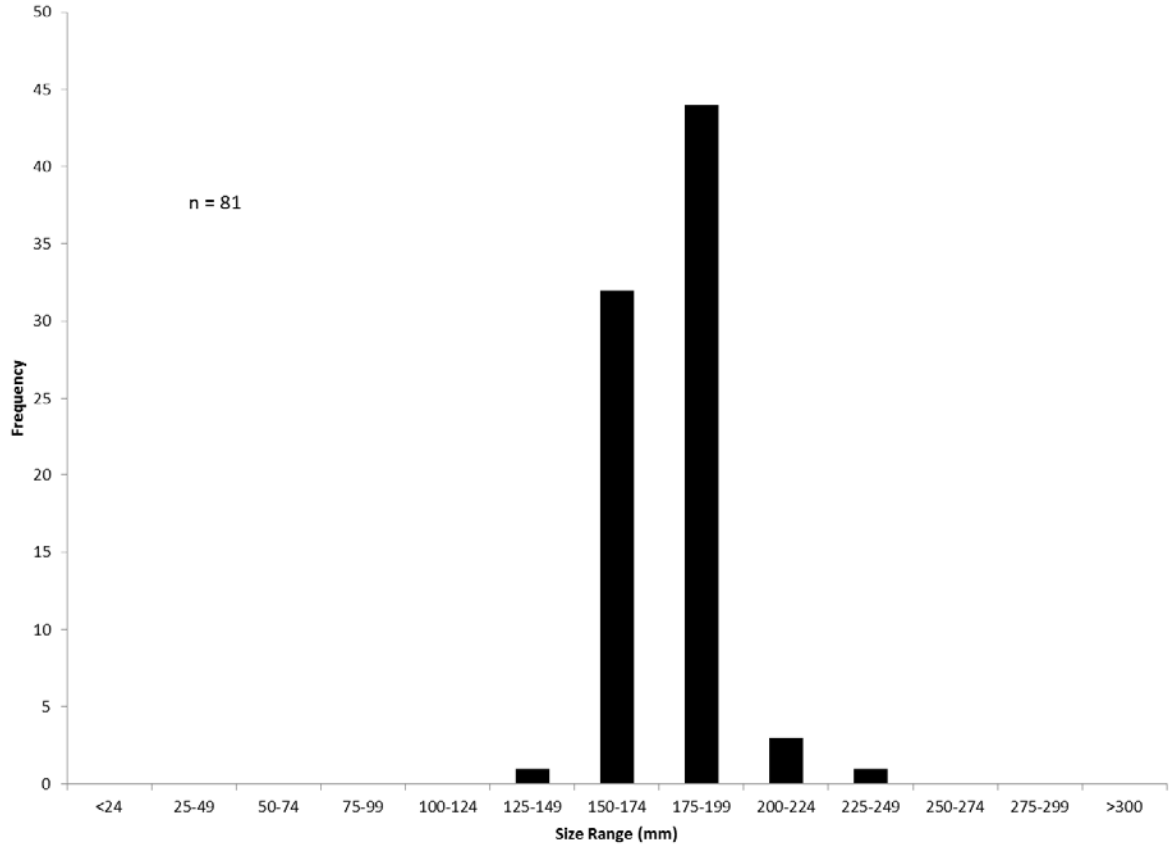


Figure 8. Length- frequency histogram of White Perch from spring trap netting Mercer Lake (2015).

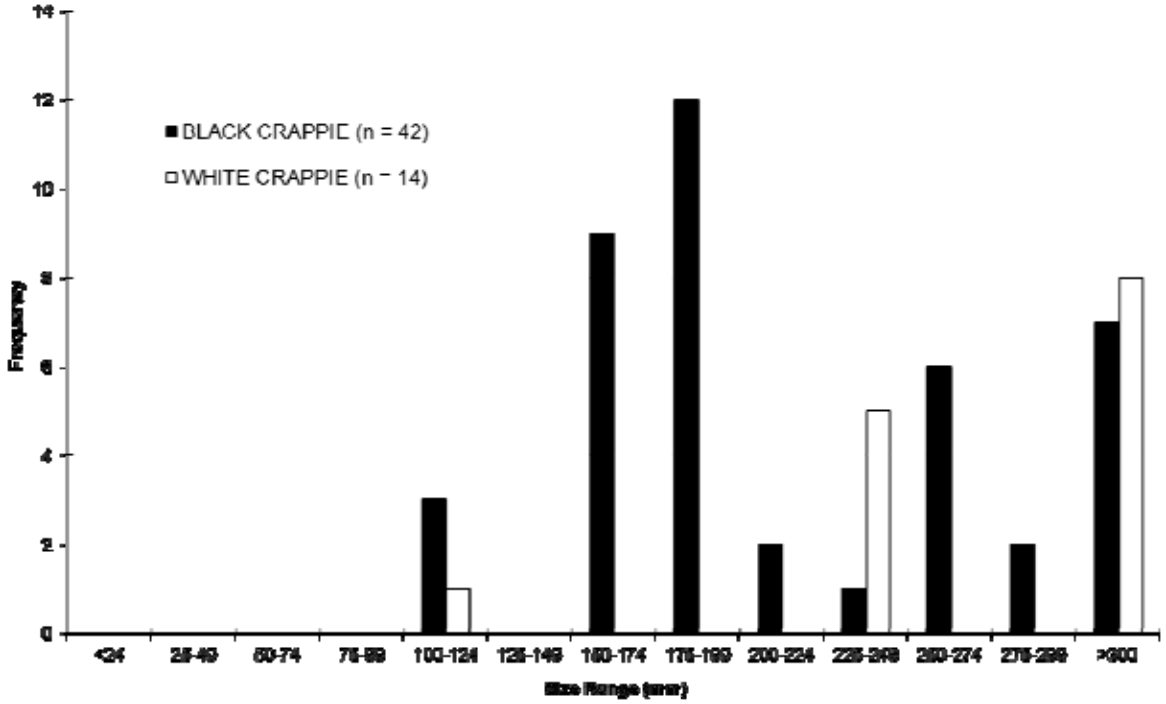


Figure 9. Length- frequency histogram of Black Crappie and White Crappie from spring trap netting Mercer Lake (2015).

Table 8. Condition of fish species captured on Mercer Lake in 2015 indicated by Relative Weight (W_r) index. Relative Weight quantifies fish condition based on how much a fish weighs for its length. A W_r of 95-105 is a typical objective for most species. Values well below 100 for a size group may be indicative of a problem in food and feeding relationships, and values well above 100 for a size group may be indicative of fish not making the best use of available prey.

Species	Range	Number	Avg W_r	95% CI (+/-)	SE	Range W_r	
						Min	Max
Yellow Perch	ALL ≥ 130	40	86	4	2.110623	60	123
	130-199	33	87	-	-	-	-
	200-249	6	78	-	-	-	-
	250-299	1	82	-	-	-	-
	≥ 300	0	-	-	-	-	-
Black Crappie	ALL ≥ 130	39	89	8	3.995083	0	185
	130-199	21	91	-	-	-	-
	200-249	3	97	-	-	-	-
	250-299	8	93	-	-	-	-
	≥ 300	7	78	-	-	-	-
White Crappie	ALL ≥ 130	13	97	3	1.408824	92	108
	130-199	0	-	-	-	-	-
	200-249	5	94	-	-	-	-
	250-299	0	-	-	-	-	-
	≥ 300	8	99	-	-	-	-
White Perch	ALL ≥ 130	81	86	2	1.268458	48	112
	130-199	77	87	-	-	-	-
	200-249	4	81	-	-	-	-
	250-299	0	-	-	-	-	-
	≥ 300	0	-	-	-	-	-
Yellow Bullhead	ALL ≥ 150	30	99	3	1.299292	81	114
	150-229	5	97	-	-	-	-
	≥ 230	25	99	-	-	-	-
Brown Bullhead	ALL ≥ 150	39	103	4	2.287802	87	175
	150-229	0	-	-	-	-	-
	≥ 230	39	101	-	-	-	-

MONKSVILLE RESERVOIR

Location: Passaic County, Ringwood Township, NJ
Drainage: Wanaque River
Target Species: Muskellunge and Walleye

Acres: 505
Avg Depth: 43 ft
Max Depth: 90 ft

Methods

Monksville Reservoir was surveyed in 2014 using trap nets for Walleye and Muskellunge but it was determined that because sampling was done in the Fall, it was not indicative or comparable of their populations' actual abundance or size structure. Therefore, a total of 16 South Dakota trap nets were set on in the reservoir from May 4 to May 8 in 2015. Three to four trap nets were set daily in water depths ranging from 3.5 to 8 ft deep and allowed to fish for 24 hours. Sample sites were selected based on historical sites and diversity of habitat. Once the nets are checked and tended, they're either relocated to different random sites to ensure all suitable habitats were sampled, or kept in the same location to obtain a larger sample size of the target species. If Muskellunge or Walleye were captured, they would be measured for total length and weight, and scales collected for growth analysis and age. Other fish species were counted for presence. Biometric data (length and weights) was collected on other species in 2014, therefore it was not necessary to assess this again. In addition to setting trap nets, nighttime electrofishing was conducted on October 6 to further assess the Walleye population.

Biological Data

A total of 1,740 fish were captured in trap nets. Bluegill, White Perch, and Black Crappie were the most common fish species present respectively (Table 9). A total of 16 species of fish were collected during the 2015 trap net survey at Monksville Reservoir. One of the target species, Walleye, was 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 the trap netting in Monksville Reservoir coincided with the tail end of the Walleye spawning period and thus the catch rate was reduced. The Walleye captured were composed of most 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 (Table 9, Figure 10). The relative weight (W_r) index indicated Walleye were in below average condition (average W_r of 90 ± 3), but this condition is expected for fish that just completed the spawning process (Table 10). The Walleye population in this reservoir appears to be in good condition, well balanced, and stable.

The other target species, Muskellunge, was found to be fairly abundant (4 total) 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 good 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 (Table 9). The relative weight (W_r) index indicates the Muskellunge were in slightly below

average condition (mean W_r of 94 ± 7) as well (Table 10). Furthermore, in 2014 and 2015 as Bureau of Freshwater Fisheries crews set and tended trap nets, multiple anglers commented on the great Muskellunge fishery here and this anecdotal evidence corroborates the empirical data collected these two years.

Nighttime electrofishing on October 6 for Walleye was unsuccessful. No Walleye were captured during this survey, which lasted 1.76 hrs. Historically, sampling at Monksville Reservoir has shown that timing of sampling can play a large role in the success of catching the target species, with more success for Walleye later in October. Catching no Walleye during this sampling event was not a concern as the trap net results produced evidence of a good Walleye fishery and the timing of our electrofishing effort may have been early. Electrofishing did show an abundant population of Largemouth Bass (CPUE of 28 fish/hr) that is well balanced as indicated by a PSD of 47, RSD_p of 12, with many size ranges represented. Chain Pickerel were even more abundant (CPUE of 44 fish/hr) and well balanced as indicated by a PSD of 40 and RSD_p of 4. The abundance of Largemouth Bass and Chain Pickerel is good news in terms of the added benefit in angling opportunities at this reservoir.

Management Recommendations

1. Recommendations for Walleye and Muskellunge will be made at the time of project completion.

Table 9. Catch per unit effort (CPUE) and stock density indices for spring trap netting on Monksville Reservoir in 2015.

Species	Total Number Caught	% of Captured	Nets Set	CPUE (Fish / Net)	PSD	95% CI (+/-)	RSD_p	RSD_m
Largemouth Bass	2	0.1	15	0.1	-	-	-	-
Chain Pickerel	23	1.3	15	1.5	-	-	-	-
Bluegill	881	50.6	15	58.7	-	-	-	-
Pumpkinseed	58	3.3	15	3.9	-	-	-	-
Yellow Perch	11	0.6	15	0.7	-	-	-	-
Black Crappie	107	6.1	15	7.1	-	-	-	-
White Perch	571	32.8	15	38.1	-	-	-	-
Yellow Bullhead	1	0.1	15	0.1	-	-	-	-
Brown Bullhead	1	0.1	15	0.1	-	-	-	-
Smallmouth Bass	6	0.3	15	0.4	-	-	-	-
Rock Bass	6	0.3	15	0.4	-	-	-	-
Walleye	41	2.4	16	2.6	85	14	75	50
Muskellunge	4	0.2	16	0.3	75	77	75	50
Channel Catfish	1	0.1	15	0.1	-	-	-	-
Golden Shiner	6	0.3	15	0.4	-	-	-	-
Alewife	21	1.2	15	1.4	-	-	-	-
Total	**1740**	100.0						

Table 10. Condition of fish species captured on Monksville Reservoir in 2015 indicated by Relative Weight (W_r) index. Relative Weight quantifies fish condition based on how much a fish weighs for its length. A W_r of 95-105 is a typical objective for most species. Values well below 100 for a size group may be indicative of a problem in food and feeding relationships, and values well above 100 for a size group may be indicative of fish not making the best use of available prey.

Species	Range (mm)	Number	Avg W_r	95% CI (+/-)	SE	Range (mm)	
						Min	Max
Walleye	ALL ≥ 250	40	90	3	1.609821	74	136
	250-379	6	95	-	-	-	-
	380-509	4	88	-	-	-	-
	510-629	10	92	-	-	-	-
	≥ 630	20	88	-	-	-	-
Muskellunge	ALL ≥ 510	4	94	7	3.75	86	102
	510-759	1	86	-	-	-	-
	760-969	0	-	-	-	-	-
	970-1069	1	102	-	-	-	-
	≥ 1070	0	95	-	-	-	-

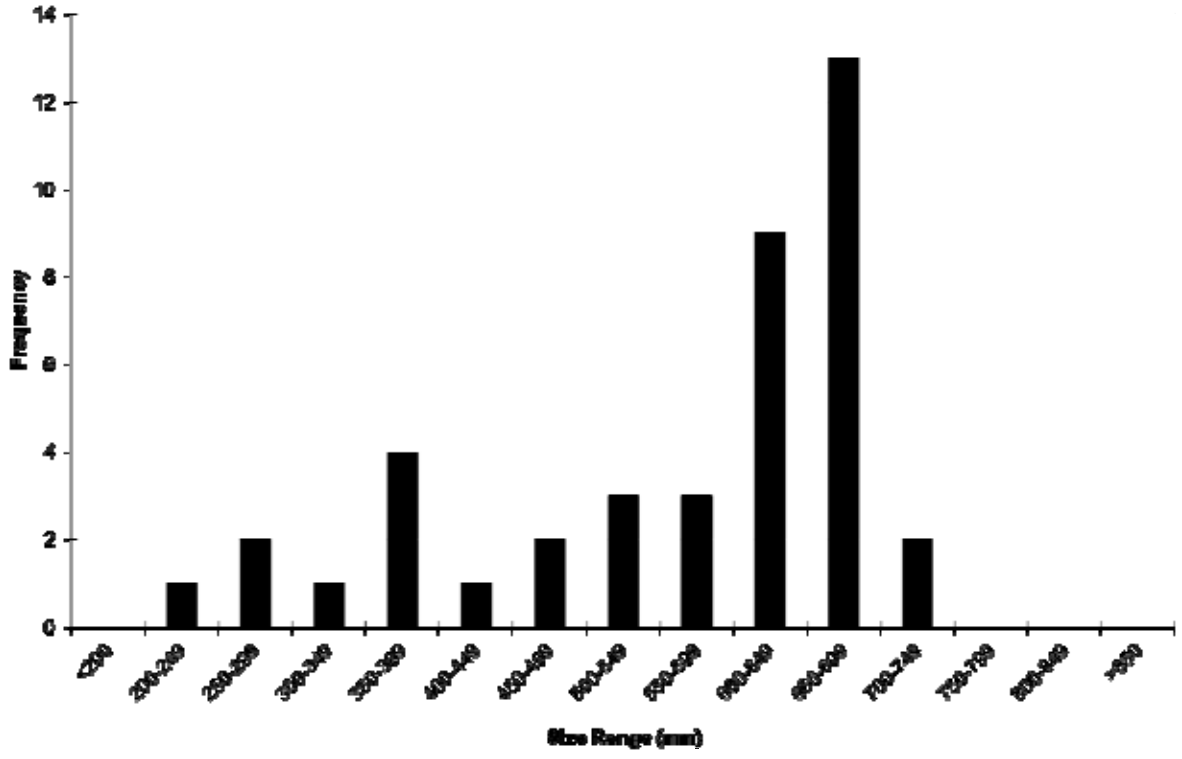


Figure 10. Length- frequency histogram of Walleye from spring trap netting Monksville Reservoir (2015).

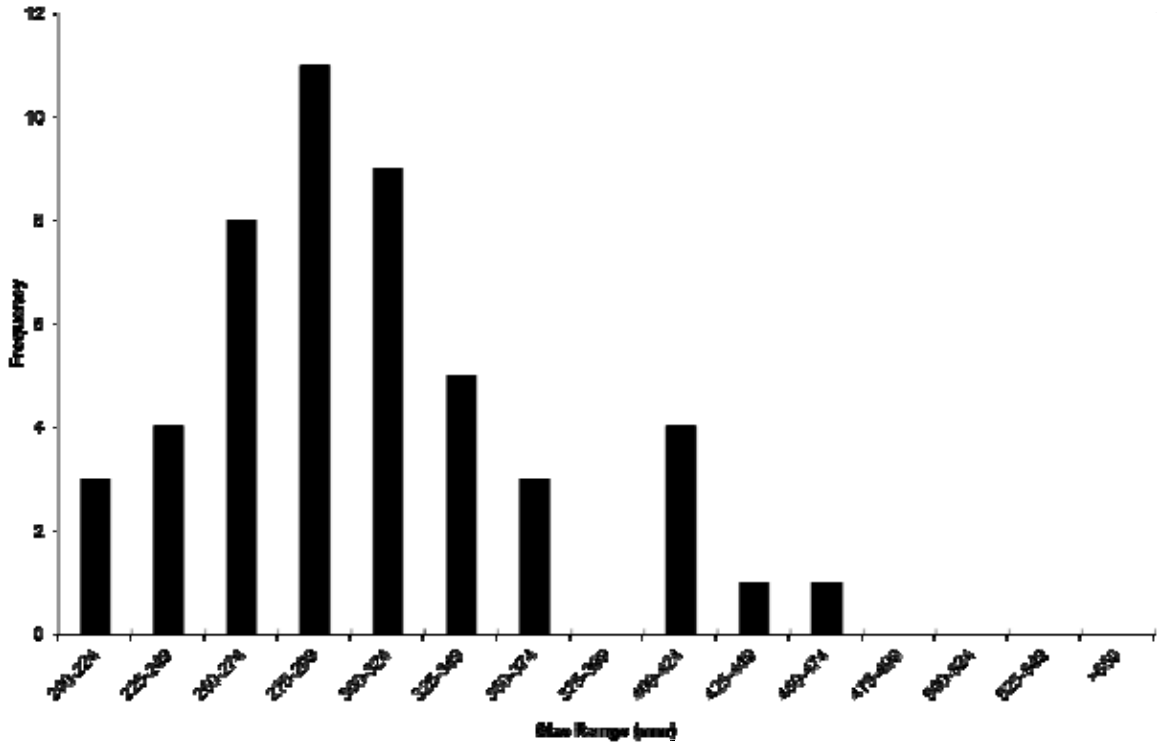


Figure 11. Length- frequency histogram of Largemouth Bass from fall nighttime electrofishing Monksville Reservoir (2015).

SWARTSWOOD LAKE

Location: Sussex County, Swartswood, NJ
Drainage: Paulins Kill
Target Species: Walleye

Acres: 519
Avg Depth: 25 ft
Max Depth: 54 ft

Methods

To assess the Walleye fishery at Swartswood Lake nighttime electrofishing was conducted on three nights in 2015, May 21, June 2, and October 20. At least an hour and a half of electrofishing was conducted each night. If Largemouth Bass, Smallmouth Bass, or the target species, Walleye, were captured, they were measured for total length and weight, and scales collected for growth analysis and age.

Biological Data

During the spring (May 21 and June 2) a total of 53 Walleye, 36 Smallmouth Bass, and 16 Largemouth Bass were captured during nighttime electrofishing. A total of 3 hours of electrofishing was conducted between these two nights and Walleye were found to be most abundant (CPUE of 15 fish/hr, Table 11). Compared to Pennsylvania Fish and Boat Commission's standard for early spring night electrofishing catch rate of 18 legal Walleye/hr, our catch rate was good considering it was late spring after the spawning period when Walleye congregate. The Walleye population was represented by mostly larger individuals indicated by a PSD of 85 and RSD_p of 43. The relative weight (W_r) index indicated Walleye were in good condition (average W_r of 100 ± 3, Table 13). Smallmouth Bass were also found to be abundant and dominated by larger individuals, with a CPUE of 10, PSD of 66, and RSD_m of 31. Six Smallmouth Bass exceeded 18 in in length and the largest was 495 mm (19.4 in) and 1.6 kg (3.5 lb).

In the fall a total of 11 Walleye, 17 Smallmouth Bass, and 28 Largemouth Bass were captured during 1.8 hours of nighttime electrofishing on October 20. As opposed to the spring when Walleye were the most abundant catch, followed by Smallmouth Bass, in the fall Largemouth Bass were found to be most abundant (CPUE of 10 fish/hr, Table 13).

In addition to electrofishing efforts in the spring and fall by the Bureau of Freshwater Fisheries, Hackettstown Hatchery sets trap nets annually on Swartswood Lake to collect Walleye broodstock and regularly captures Walleyes numbering in the hundreds. With spring night electrofishing success and the Hatchery's continued annual success in trap netting broodstock in the spring, the Walleye fishery appears to be doing well.

Management Recommendations

1. Recommendations for Walleye will be made at the time of project completion.

Table 11. Catch per unit effort (CPUE) and stock density indices for spring nighttime electrofishing on Swartswood Lake in 2015.

Species	Total Number Caught	Number > Stock Size Caught	% of Captured	Hours sampling	CPUE (stock size)	PSD	95% CI (+/-)	RSD_p	RSD_m
Largemouth Bass	16	16	15.2	3	5	69	31	31	0
Smallmouth Bass	36	29	34.3	3	10	66	22	55	0
Walleye	53	46	50.5	3	15	85	13	43	2
Total	**105**								

Table 12. Condition of fish species captured on Swartswood Lake in the spring of 2015 indicated by Relative Weight (W_r) index. Relative Weight quantifies fish condition based on how much a fish weighs for its length. A W_r of 95-105 is a typical objective for most species. Values well below 100 for a size group may be indicative of a problem in food and feeding relationships, and values well above 100 for a size group may be indicative of fish not making the best use of available prey.

Species	Range (mm)	Number	Avg W_r	95% CI (+/-)	SE	Range (mm)	
						Min	Max
Largemouth Bass	ALL ≥ 200	16	99	5	2.367257	85	115
	200-299	5	100	-	-	-	-
	300-379	6	99	-	-	-	-
	380-509	5	98	-	-	-	-
	≥ 510	0	#DIV/0!	-	-	-	-
Smallmouth Bass	ALL > 180	29	83	4	1.855361	66	108
	180-279	10	89	-	-	-	-
	280-349	3	84	-	-	-	-
	350-429	7	83	-	-	-	-
	≥ 430	9	76	-	-	-	-
Walleye	ALL ≥ 250	46	100	3	1.469232	61	120
	250-379	7	105	-	-	-	-
	380-509	19	102	-	-	-	-
	510-629	19	96	-	-	-	-
	≥ 630	1	92	-	-	-	-

Table 13. Catch per unit effort (CPUE) and stock density indices for fall nighttime electrofishing on Swartswood Lake in 2015.

Species	Total Number Caught	Number > Stock Size Caught	% of Captured	Hours sampling	CPUE (stock size)	PSD	95% CI (+/-)	RSD_p	RSD_m
Largemouth Bass	28	18	50.0	1.8	10	78	27	56	0
Smallmouth Bass	17	16	30.4	1.8	9	38	32	6	0
Walleye	11	8	19.6	1.8	4	100	13	50	0
Total	**56**								

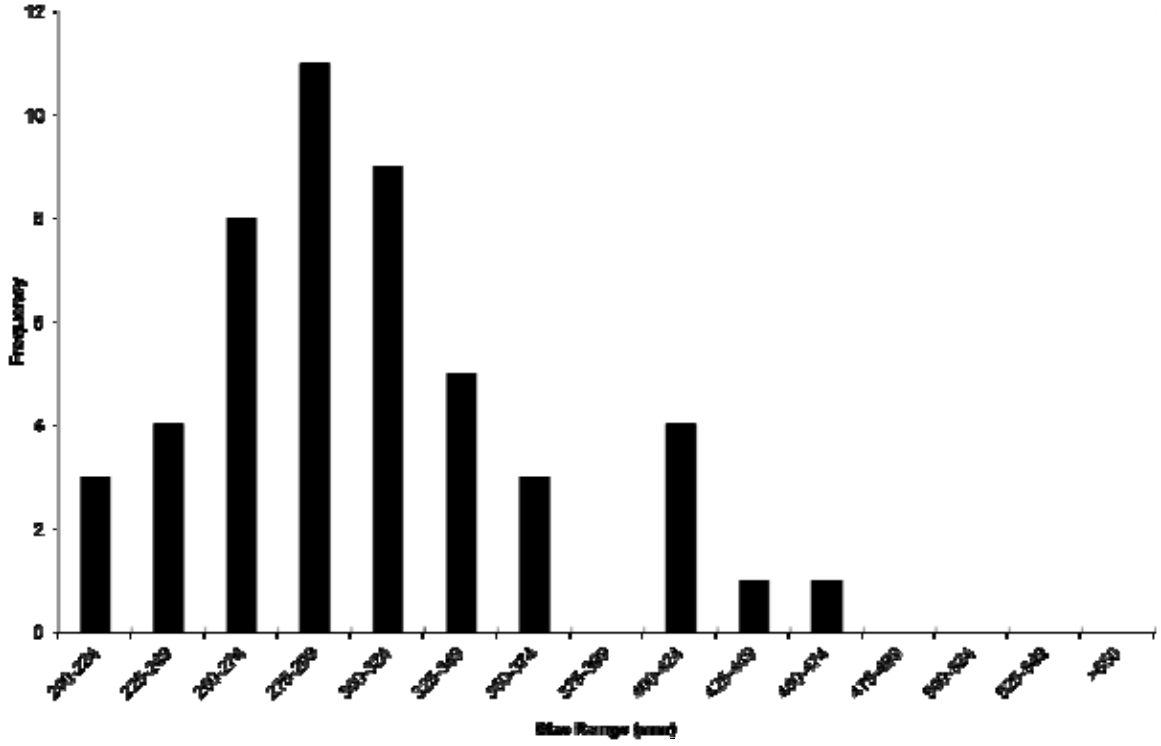


Figure 12. Length- frequency histogram of Walleye from spring nighttime electrofishing Swartswood Lake (2015).

CANISTEAR RESERVOIR

Location: Sussex County, Vernon Twp., NJ
Drainage: Pequannock River
Target Species: Walleye

Acres: 519
Avg Depth: 25 ft
Max Depth: 54 ft

Methods

To assess the Walleye fishery at Canistear Reservoir nighttime electrofishing was conducted on October 13. When Largemouth Bass, Smallmouth Bass, or the target species, Walleye, were captured, they were measured for total length and weight, and scales collected for growth analysis and age.

Biological Data

On October 13 a total of 21 Walleye, 67 Smallmouth Bass, and 13 Largemouth Bass were captured during nighttime electrofishing. A total of 1.2 hours of electrofishing was conducted and Smallmouth Bass were found to be most abundant (CPUE of 42 fish/hr, Table 14). The Smallmouth Bass population was well balanced indicated by a PSD of 52 and RSD_p of 22. The Walleye population was only moderately abundant with a CPUE of 8 fish/hr (Table 15). Of those that were captured, most were larger individuals indicated by a PSD of 80 and RSD_p of 30. The Walleye population will continue to be monitored here to obtain more data. Fall nighttime electrofishing for Walleye in general resulted in low CPUE. Of the three waterbodies sampled, Walleye CPUE effort averaged about 4 Walleye/hr and the catch rate on Canistear Reservoir was double that average. This catch rate is still low so additional sampling needs to be done on Canistear Reservoir to assess this fishery further.

Management Recommendations

1. Recommendations for the Walleye fishery here will be made at the time of project completion.

Table 14. Catch per unit effort (CPUE) and stock density indices for fall nighttime electrofishing on Canistear Reservoir in 2015.

Species	Total Number Caught	Number > Stock Size Caught	% of Captured	Hours sampling	CPUE (stock size)	PSD	95% CI (+/-)	RSD_p	RSD_m
Largemouth Bass	13	10	12.9	1.2	8	50	45	50	0
Smallmouth Bass	67	50	66.3	1.2	42	52	17	22	0
Walleye	21	10	20.8	1.2	8	80	38	30	0
Total	**101**								

Table 15. Condition of fish species captured from Canistear Reservoir in the Fall of 2015 indicated by Relative Weight (W_r) index. Relative Weight quantifies fish condition based on how much a fish weighs for its length. A W_r of 95-105 is a typical objective for most species. Values well below 100 for a size group may be indicative of a problem in food and feeding relationships, and values well above 100 for a size group may be indicative of fish not making the best use of available prey.

Species	Range (mm)	Number	Avg W_r	95% CI (+/-)	SE	Range (mm)	
						Min	Max
Largemouth Bass	ALL ≥ 200	10	97	5	2.314392	83	109
	200-299	5	96	-	-	-	-
	300-379	0	-	-	-	-	-
	380-509	5	97	-	-	-	-
	≥ 510	0	-	-	-	-	-
Smallmouth Bass	ALL > 180	50	88	4	1.863907	40	150
	180-279	24	91	-	-	-	-
	280-349	15	86	-	-	-	-
	350-429	5	92	-	-	-	-
	≥ 430	6	80	-	-	-	-
Walleye	ALL ≥ 250	10	93	5	2.36985	79	105
	250-379	2	100	-	-	-	-
	380-509	5	96	-	-	-	-
	510-629	3	83	-	-	-	-
	≥ 630	0	-	-	-	-	-

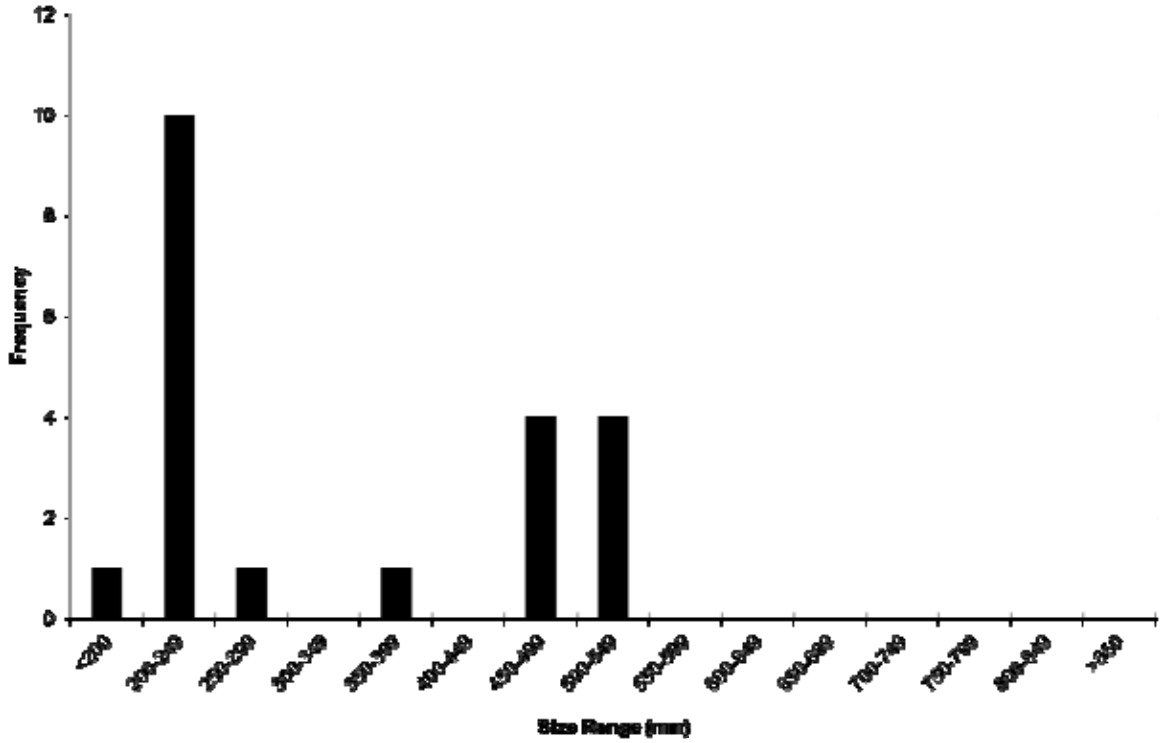


Figure 13. Length- frequency histogram of Walleye from fall nighttime electrofishing Canistear Reservoir (2015).

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Opening Day Trout Angler Survey Report (2015)

Investigations and Management of New Jersey's Freshwater Fisheries Resources (APPENDIX H)

By
Scott Collenburg, Assistant Fisheries Biologist

April 4, 2015

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

Sportfish Restoration Grant F-48-R

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

2015 New Jersey Division of Fish and Wildlife Opening Day Angler Survey Report

by Scott Collenburg, Assistant Fisheries Biologist

Table of Contents

What are Angler Surveys?

Angler (or sometimes referred to as "creel") surveys are one device utilized by Fisheries Managers to help protect and enhance freshwater fishing opportunities. An angler survey is a widely applied and broad term that simply refers to methods of sampling that are used to collect recreational fishing information.

Many anglers who fish on Opening Day of trout season may already be familiar with the Bureau of Freshwater Fisheries use of angler surveys given that this tool has been utilized since 2004 on about 120 trout stocked locations throughout the Garden State. So, if you fish on Opening Day, you may have a good chance of having your voice heard and taking part in the management of New Jersey's freshwater fisheries. Just another, of many good reasons, to get out there and fish!

The Bureau of Freshwater Fisheries (BFF) relies on anglers to gather information about angler success, fishing preferences, interests, and attitudes, not only about trout stocking, but also about the Division's Freshwater Fishery program. The BFF collects angler information through multiple formats: phone, online, angler logbooks, or on-site surveys. The type of angler survey that is used on Opening Day is referred to as an "On-Site Creel Survey" because surveys or interviews are conducted at the time the angler is fishing. Traditionally, anglers kept their catch in a wicker basket, also known as a creel. Even though anglers commonly opt to store their catch on a stringer or in a cooler, the term creel still refers to what an angler has caught. The intent of this type of data is to provide the Division with information to better understand anglers, provide better service, and ultimately improve fishing throughout New Jersey.

The Opening Day Angler Survey has two main objectives: (1) to record angler presence or turnout on specific waterbodies and (2) to determine angler success. This data is gleaned from casual interviews with anglers. Data about species specific catch, waterbody conditions, cormorant activity, and other pertinent information is also collected to enable the Bureau of Freshwater Fisheries to better manage the waterbodies that are being stocked with trout. The emphasis of the opening day survey is on lakes and ponds because of the difficulty in obtaining and assessing accurate angler turnout and success on streams. Beginning in 2013, on selected waterbodies, specific questions were asked to gauge angler reaction to possible regulation changes or their preference on species of fish they fish for. This year, specific questions were asked of all anglers about our Fall trout stocking program.

Below: Rosedale Lake, Wesley R. VanPelt on 4/4/2015
Photo Credit: Caitie Caroleo, WCC

How are surveys conducted?

Wildlife Conservation Corps (WCC) volunteers assist Fish and Wildlife staff in conducting surveys on various waterbodies on Opening Day of trout season. Each volunteer, or angler survey clerk, is assigned a waterbody and given written instructions to be reviewed before Opening Day so questions or concerns about the survey can be addressed. A total of 35 WCC volunteers conducted surveys this year, our largest group of volunteers we ever had for this project!

All individuals who are fishing are counted by angler survey clerks to help determine angler turn-out. Total counts of anglers fishing are made at 8 a.m., 9 a.m., 10 a.m., 11 a.m., and 12 p.m. From the five counts made, the highest count is used as an indicator of total turnout on that specific waterbody. A limitation to making angler counts hourly is that turnover is not taken into account. For example, if 10 anglers leave the waterbody, and 10 new anglers arrive, the count would still be 10. However, survey clerks would have a difficult time keeping track of all anglers coming and going, especially on large waterbodies, as they rove between different locations interacting with anglers.

Above: Grenloch Lake, 4/4/2015
Photo credit: Jeff Bower, WCC

Between angler counts, survey clerks begin wandering around and having casual conversations with anglers. Survey clerks record angler catches, what successful anglers are using to catch trout, observations about the fishing action in general, and any other pertinent information supplied by the anglers or observed by the survey clerk.

Survey clerks record their gathered data on supplemental data forms and then send them back to the Division of Fish and Wildlife so it can be compiled and analyzed. Lakes and streams are analyzed separately because of the difficulty in counting total anglers fishing on a given stream stretch at one particular point in time. Angler counts on streams are not as reliable and can skew actual angler turnout.

Results of the 2015 Opening Day Angler Survey

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, 2109 anglers (Figure 1) were observed fishing (an average of ~64 anglers per waterbody). Note that angler counts do not take into account turnover; we do not keep track of the number of anglers coming and going. For example, a volunteer survey clerk at a waterbody may record 100 anglers on any given hour, then, they count 100 anglers the next hour; this second count does not take into account anglers that may have left or arrived in that time interval. By making counts using our methods (number of anglers counted every hour and using the highest number to indicate count) we run the risk of underestimating the amount of anglers that actually fished on Opening Day on any given waterbody. Bear in mind the difficulty in tracking turnover as survey clerks are constantly interviewing anglers and roving between different locations on a waterbody.

There were reports of great trout fishing, but in many places fishing was curtailed by the high winds that made frustrated anglers pack it in early. Many survey clerks reported number of anglers at a waterbody were highest at 8 a.m. or sometimes 9 a.m. but dropped heavily by 10 a.m. and throughout the rest of the day because of the weather. Many waterbodies still had a good amount of ice that was enough to make shoreline access difficult but wasn't enough to ice fish (creel clerks verified large amounts of ice at Lake Musconetcong in Morris County, Mountain Lake and Furnace Lake in Warren County, and Stony Lake and Lake Ocquittunk in Sussex County). Some creel clerks counted over 100 anglers at their respective waterbodies, they included Spring Lake, Sylvan Lake, Verona Park Pond, Dahnert's Lake, and Echo Lake. However, some waterbodies, such as Lake Shenandoah (16), Branch Brook Park Pond (13), and Lake Papaianni (7) were noted as having low angler turnouts.

A complete list of Opening Day angler turnouts can be found in Table 1 along with trout catch information. At Sylvan Lake, Dahnert's Lake, Holmdel Park Pond, and Echo Lake, anglers were successful catching 85, 71, 53 and 51 trout, respectively. Waterbodies that reported no trout caught or less than 5 trout caught between all anglers included:

- Pemberton Lake
- Rosedale Lake
- Heritage Pond
- Colonial Lake
- Crystal Lake
- Lake Shenandoah
- Manny's Pond
- Roosevelt Park Pond
- Lake Papaianni

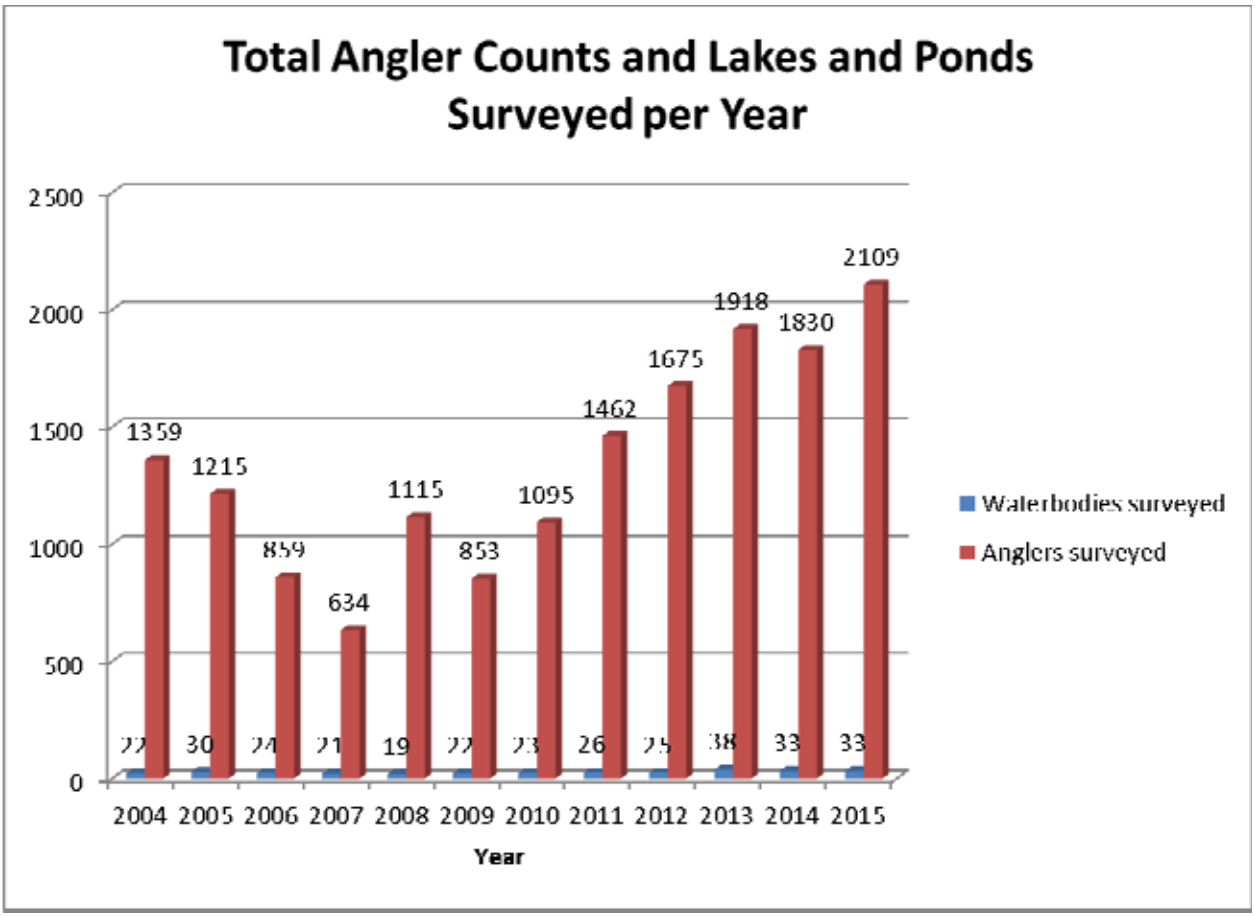


Figure 1: Opening Day angler counts over the past 11 years (official angler turnout is estimated from taking the highest of five hourly counts between 8a.m. and 12p.m.). Angler counts completed before 2012 were conducted from 8a.m. – 11a.m.

Trout-stocked Lakes and Ponds

On 33 lakes and ponds that had surveys conducted, twelve reported 50 or more anglers. Spring Lake had the highest turnout with approximately 600 anglers counted at one point. The Shark River Surf Anglers club was sponsoring a children's fishing tournament at this location. Verona Park Pond continues to be a popular spot for anglers (after having the highest turnout in 2012 (182), 2013 (125), and had the second highest turnout in 2014 (161)), 122 anglers were counted at one point. Some key highlights from Opening Day are as follows:

- Great fishing and high numbers of trout caught (an average of over 1 trout per angler) were reported at Diamond Mill Pond, Branch Brook Park Pond, and Speedwell Lake.
- Low catch rates (1 fish or less for every 5 anglers) were reported at Roosevelt Park Pond, Rosedale Lake, Heritage Park Pond, Pemberton Lake, Crystal Lake, Colonial Lake, Lake Shenandoah, Manny's Pond, and Lake Papaianni (Table 1).
- A high percentage of the allocated trout at Dahnert's Lake (28%) and Holmdel Park Pond (25%) were caught during the first four hours of opening day.

Table 1: Lakes and ponds included in the angler survey showing 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)

Trout-stocked Streams and Rivers

Angler counts and success on streams and rivers is difficult to assess because the distance that has to be covered and the movement in and out of fishing spots by anglers. However, getting angler input and having casual conversations with as many anglers as possible gives us a general idea of how successful and happy anglers are with fishing on Opening Day. Angler surveys and counts were conducted on the following 5 stream sections: Musconetcong River (Stephens State Park), Paulins Kill River (Warren), Paulins Kill River (Sussex), Pohatcong Creek (Warren), Rockaway River, and Stony Brook.

- The Musconetcong River at Stephens State Park had a large turnout but many anglers were unsatisfied with catch rates and asked if the river was actually stocked. Volunteer survey clerk, Rick Ege noted that by 11:30 a.m. the number of anglers started dropping and by 12:30 p.m. few anglers were left on the river.
- The Paulins Kill River (Warren) suffered from like other stream and rivers throughout the state on this day from high water levels and wind making fishing difficult. Many anglers left early but fishing improved later in the morning.
- On the Paulins Kill River (Sussex) anglers did well in upper sections starting in Sparta Township, but not as well further downstream close to Stillwater.
- On the Pohatcong Creek by Franklin Twp Elementary School fishing activity was fairly slow.
- The Rockaway River had a good turnout. Action was good except for the North Main Street bridge area.
- Stony Brook in Mercer County was surveyed and volunteer survey clerk, Chris Reutlinger, noted slow fishing and a low turnout. Only 4 Rainbow Trout were caught during the survey.

Update: Are Rainbow Trout Easier to Catch?

In 2012 and 2013, for our Spring Trout Program, eight waterbodies were stocked pre-season with a mix of Brook and Rainbow Trout (50% each species) rather than the traditional 100% Brook Trout, to see if anglers were more successful catching one species.

Between 2012 and 2013 Rainbow Trout were caught more often than Brook Trout overall (430 Rainbow Trout compared to 206 Brook Trout). With the exception of Amwell Lake in 2012, on every waterbody Rainbow Trout gave anglers a better return to creel compared to Brook Trout (Figure 2).

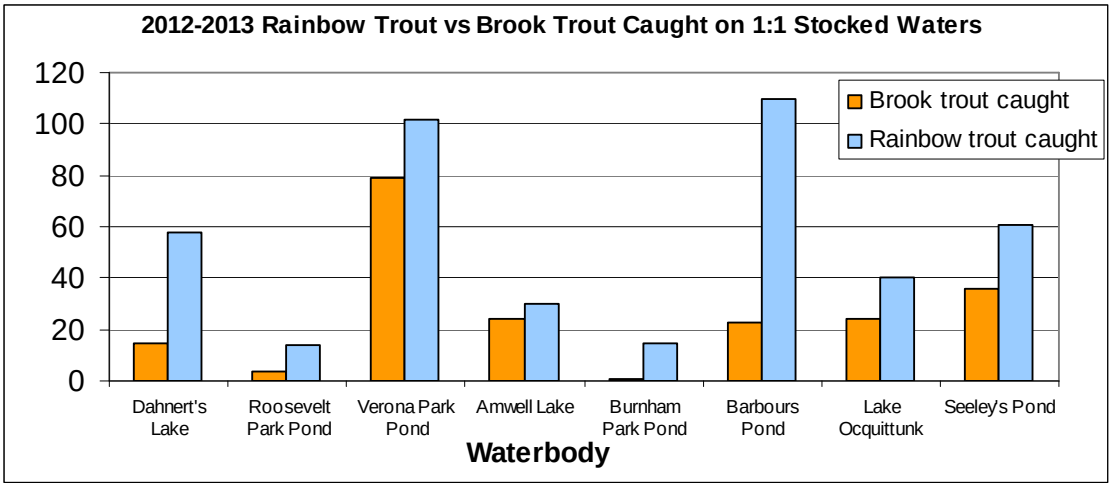


Figure 2: 2012-2013 cumulative return to creel of Rainbow Trout and Brook Trout on waterbodies that received 1:1 stocking.

In 2014 we continued to look into species specific catch rates. The 33 waterbodies that were surveyed on Opening Day received either full allocations of Rainbow Trout or full allocations of Brown Trout. Twelve waterbodies received Rainbow Trout and twenty received Brown Trout. When looking at the data from opening day surveys we discovered that Rainbow Trout continued to give anglers a better return to creel on lakes and ponds (this time compared to Brown Trout). Of the 10,020 Rainbow Trout stocked in 12 waterbodies surveyed, 539 Rainbow Trout were caught (5% of the Rainbow Trout allocated were caught during the Opening Day survey), and of the 27,070 Brown Trout stocked in 20 waterbodies surveyed, 295 Brown Trout were caught (1% of the Brown Trout allocated were caught during the Opening Day survey). In addition, considering fishing pressure on lakes stocked with just Brown Trout were more than double, it makes the argument that Rainbow Trout are more aggressive and easier to catch, that much easier to make.

This year the Division of Fish and Wildlife stocked just Rainbow Trout because of their ability to be more resistant to becoming symptomatic with the disease that hit 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 by all the empirical data that we collected thus far, they prove to be superior in terms of their activity, aggressiveness, and readiness to bite a hook. Again, we were interested in looking at actual data to show this improvement in catch rates. To do this we surveyed waterbodies that were stocked with Rainbow Trout in 2014 and 2015 (our control group), and in addition, we surveyed waterbodies that were stocked with Brown Trout in 2014 and Rainbow Trout in 2015 (our experimental group) to see if catch rates would increase 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)

Our 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 (Figure 3). At Blair Lake, higher Catch Rate per Allocated Trout in 2014 was due in part because of ice coverage on the lake in 2015. Our experimental group showed that 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.

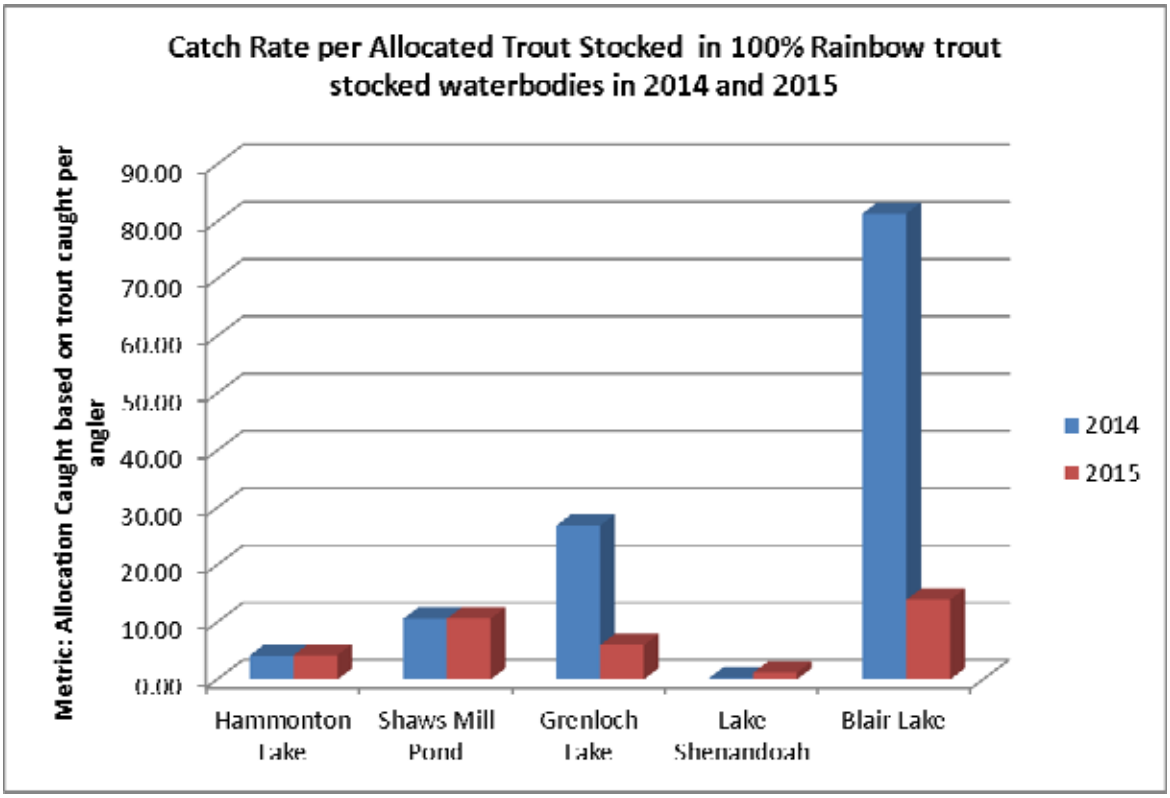


Figure 3: A comparison of Catch Rate per Allocated Trout on Rainbow Trout stocked waterbodies in 2014 and 2015. Blair Lake had a lot of ice coverage in 2015 making fishing difficult.

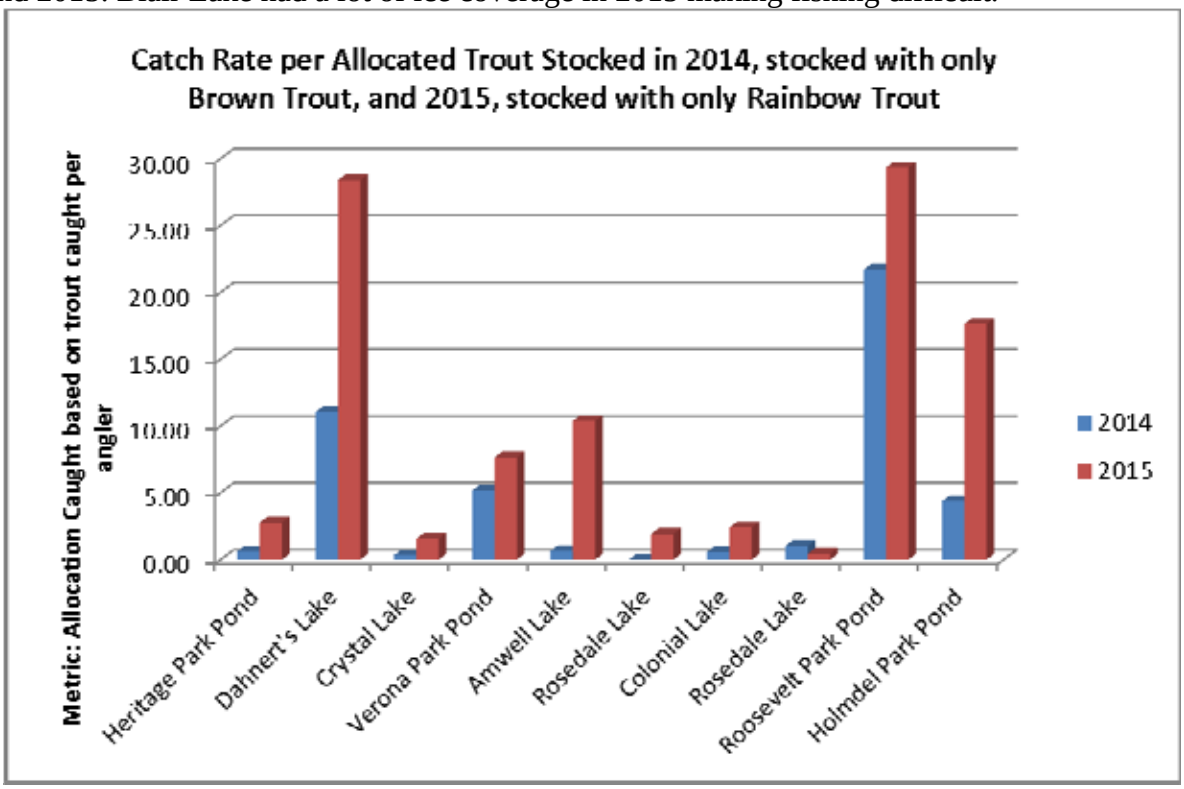
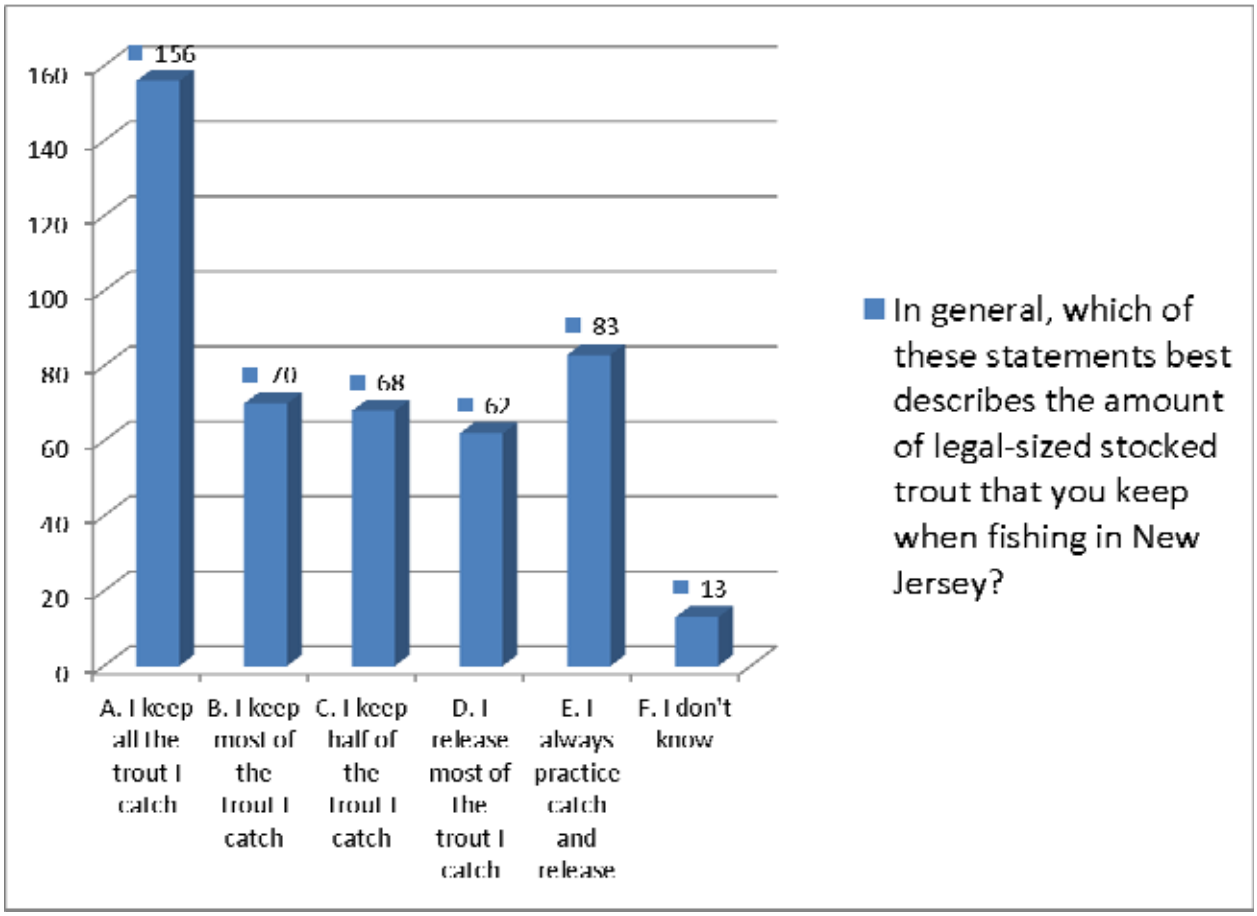


Figure 4: A comparison of Catch Rate per Allocated Trout on Brown Trout stocked waterbodies in 2014, and Rainbow Trout stocked waterbodies in 2015.

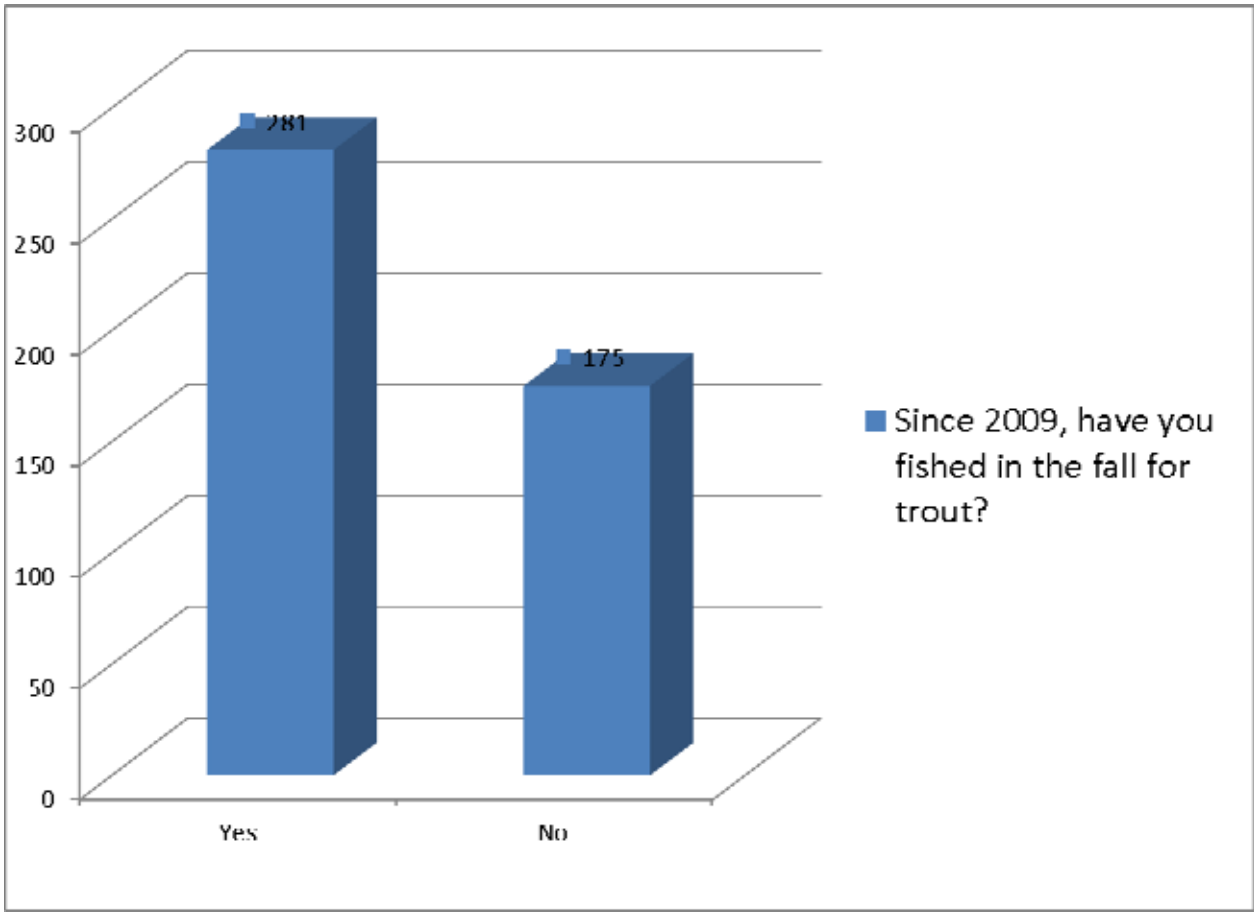
Angler Interview Questions

Specific questions were asked this year on select waterbodies to garner input from anglers who fish Opening Day. Questions pertained to our fall trout stocking program. The following questions were posed to anglers:

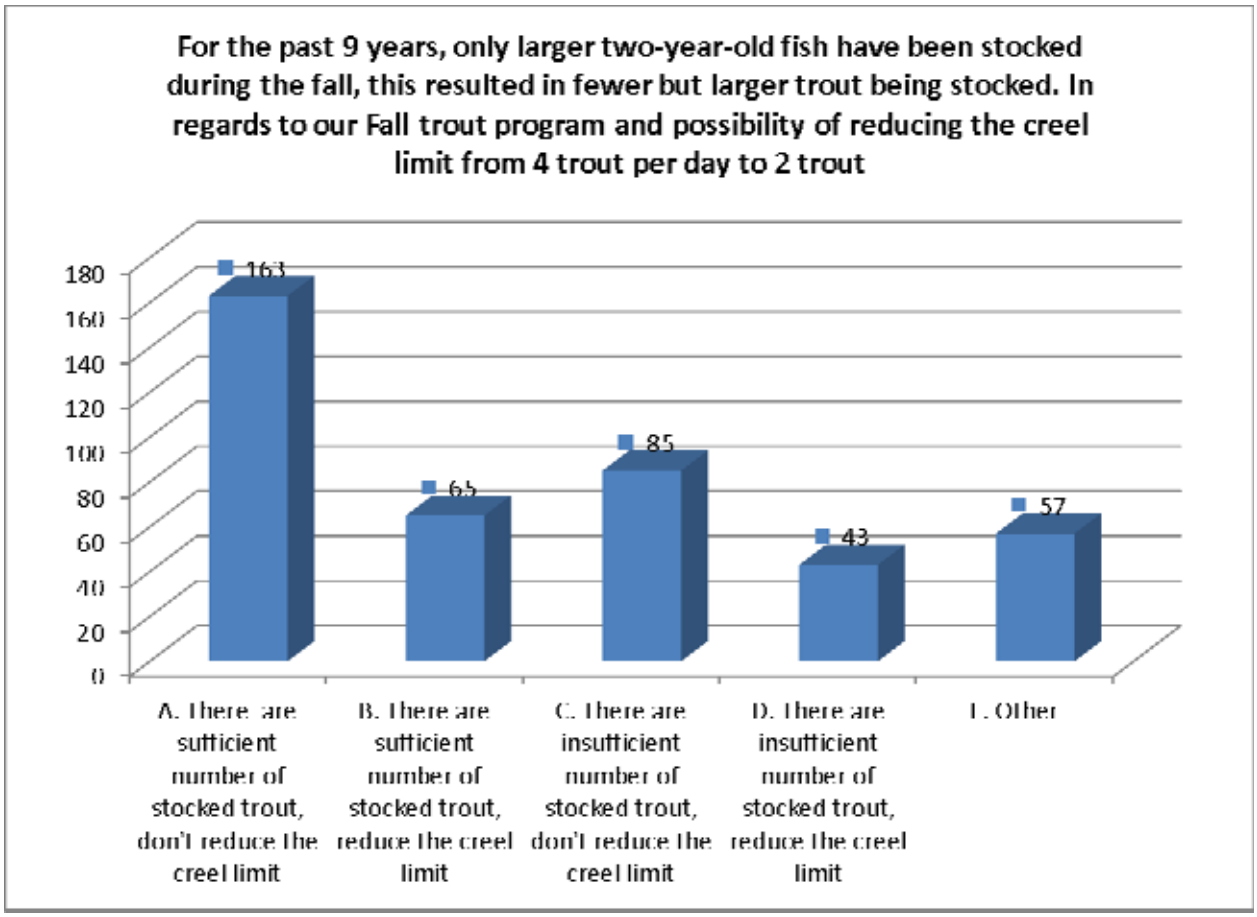
Trout Angler Interview Questions posed to anglers:



- Of the 452 anglers asked this question, a majority keep all the trout they catch (156).
- The second highest category of practice that best describes anglers fishing on opening day is catch and release (83).



- Of the 456 anglers asked this question, over 61% of them fish for trout in the fall.



- Of the 413 anglers asked this question, a majority (> 39%) believe that there are sufficient number of stocked trout and don't want the creel limit reduced.
- A total of 55% of anglers answered either A or B (there are a sufficient number of stocked trout), and 31% of anglers answered either C or D (there are insufficient number of stocked trout).
- A total of 60% of anglers answered either A or C (don't reduce the creel limit), and 26% of anglers answered either B or D (reduce the creel limit).

In Summary

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. Impresssive 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."

Table 2. The five waterbodies that had highest percent of allocated trout caught during the opening day survey in 2015.

County	Waterbody	BB[1]	Total # of Anglers	Total # of Trout Caught	Trout Caught/ Angler	Allocated # of Trout	Percent Allocation Caught
Bergen	Dahnert's Lake		100	71	0.71	250	28
Monmouth	Holmdel Park Pond	**X**	86	53	0.62	210	25
Burlington	Sylvan Lake	**X**	143	85	0.59	420	20
Essex	Diamond Mill Pond		30	48	1.60	310	15
Monmouth	Echo Lake	**X**	100	51	0.51	350	15

[1]Bonus Broodstock Waterbodies

Despite the slow start to the spring trout fishing season, anglers will hopefully be more successful as the season progresses. Reports and detailed results noted by volunteer survey clerks for each waterbody surveyed can be found in the appendix of this report.

Acknowledgements
New Jersey Fish and Wildlife's Bureau of Freshwater Fisheries owes sincere thankfulness to the Wildlife Conservation Corp (WCC) volunteers, who make this project possible every year. Together with NJDFW staff we covered 40 waterbodies! We would like to show our gratitude to the following volunteers and NJDFW staff that made this project possible:

Name	Affiliation	Name	Affiliation
Arthur Lemise	WCC	Michael Sankowich	WCC
Denise Ramick-Wenslow	WCC	Megan Lade	WCC
Christopher Martin	WCC	Hugh Merritt	WCC
Mike Santino	WCC	Robert Bodnar	WCC
Joseph Russell	WCC	Joanna Peluso	WCC
Kara Jalkowski	WCC	James Lesnefsky	WCC
Steve Krumm	WCC	Kent Becker	WCC
Lauren Wasserman	WCC	Tom Karakowski	WCC
Hung V Le	WCC	Marie Ciaffa	WCC
Jillian Agrello	WCC	Sean McBride	WCC
Jeff Bower	WCC	Joseph Dante	WCC
Jim Kinney	WCC	Rick Ege	WCC
Barbara Wingel	WCC	Willi Huber	WCC
Heather Aupperle	WCC	Ed Sinning	WCC
Caitie Caroleo	WCC	John Feltovic	WCC
Chris Reutlinger	WCC	Shawn Crouse	NJDFW
Chris Ambrose	WCC	Charles Sedor	NJDFW
Anthony Acceta	WCC	Pat Hamilton	NJDFW
Kathy Collins	WCC	Ross Shramko	NJDFW

Appendix 1-1: Complete information and details included from opening day angler surveys.

County	Waterbody	Lake/ River Conditions	# of Cormorants Present	Time	# of Shoreline anglers		# of Boat anglers		Total # of anglers	Brook Trout caught				Brown Trout caught				Rainbow Trout caught				Total trout caught	Angler comments / Interviewer observations
										<14 in		>14 in		<14 in		>14 in		<14 in		>14 in			
					adult	child	adult	child		kept	rel	kept	rel	kept	rel	kept	rel	kept	rel	kept	rel		
Atlantic	Hammonton Lake	Choppy/ Clear/ High water	1	8:00	42	9	12	2	65	3	0	1	0	0	0	0	0	15	2	1	0	22	Cloudy, windy, chopy. Good amount of shore anglers to start, then started to leave. One very good sized brook trout caught. (Tim McWilliams, WCC)
				9:00	46	9	20	2	77														
				10:00	35	9	19	2	65														
				11:00	29	9	8	0	46														
				12:00	29	9	11	0	49														
Atlantic	Heritage Park Pond	Choppy	3	8:00	18	5	0	0	23	0	0	0	0	0	0	0	0	0	0	3	0	3	Not many anglers were catching any fish except for one guy who caught three. (Molly Hillenbrand, WCC)
				9:00	21	4	0	0	25														
				10:00	20	4	0	0	24														
				11:00	12	1	0	0	13														
				12:00	12	3	0	0	15														
Bergen	Danhert's Lake	Muddy/ Choppy	4	8:00	74	11	0	0	85	0	0	0	0	0	0	0	0	70	0	1	0	71	Sunny to partly sunny all day, 48-51°, NW wind 15-30 mph/gusty. Most success with hot pink powerbait and gold spinners. Worms and killies not so good. Most anglers had 2 or more fish. Very windy. Cormorants actively feeding on trout all day (Arthur Lemise, WCC)
				9:00	83	17	0	0	100														
				10:00	62	14	0	0	76														
				11:00	34	5	0	0	39														
				12:00	26	4	0	0	30														
Burlington	Crystal Lake	Choppy/ Clear	0	8:00	-	-	-	-	-	0	0	0	0	0	0	0	0	2	0	0	0	2	Fish not biting, anglers not happy. Wanted to know if really stocked. Only 1 fly fisher, most using spnning rods/bait casters. One angler said he could see RBT but couldn't get them to bite. Anglers got more bitter as the day progressed (Denise Ramick-Wenslow, WCC)
				9:00	-	-	-	-	-														
				10:00	16	3	4	0	23														
				11:00	14	2	2	0	18														
				12:00	11	1	0	0	12														
Burlington	Pemberton Lake	Muddy/ Choppy	0	8:00	35	5	1	1	42	0	0	0	0	0	0	0	0	4	0	0	0	4	Many angler comments about being unsuccessful. Few comments shoreline is difficult to fish due to brush. Would like brush cut back. Some comented that they would like to see more brown, brook and breeder trout stocked (Christopher Martin, WCC)
				9:00	25	6	5	3	39														
				10:00	21	5	10	1	37														
				11:00	14	2	5	1	22														
				12:00	11	1	4	0	16														
Burlington	Sylvan Lake	Clear	0	8:00	81	22	12	3	118	0	0	0	0	0	0	0	0	40	7	34	4	85	Started out around 50°as sun came out around 8:30, some more people started to show. When wind picked up around 10:30 it started to drive some people away. Catch strongest between 9-10AM. (Mike Santino, WCC)
				9:00	98	25	18	2	143														
				10:00	77	17	12	3	109														
				11:00	59	13	8	1	81														
				12:00	40	7	10	2	59														
Camden	Haddon Lake	Choppy/ Clear	9	8:00	50	8	0	0	58	0	0	0	0	0	0	0	0	10	4	1	2	17	Cormorants were counted several times and diving frequently, though only 1 observed eating trout. Many anglers commented it was the first time they have them at Haddon Lake. (Joseph Russell, WCC)
				9:00	46	6	0	0	52														
				10:00	35	6	0	0	41														
				11:00	37	6	0	0	43														
				12:00	36	8	0	0	44														
Cape May	Ponderlodge Pond	Choppy/ Clear	0	8:00	44	18	0	0	62	0	0	0	0	1	0	0	0	34	2	1	1	39	Too much vandalism, not enough Fish and Game presence. Kids swimming. (Kara Jalkowski, WCC)
				9:00	48	25	0	0	73														
				10:00	42	20	0	0	62														
				11:00	26	10	0	0	36														
				12:00	19	9	0	0	28														

Appendix 1-1: Complete information and details included from opening day angler surveys.

County	Waterbody	Lake/ River Conditions	# of Cormorants Present	Time	# of Shoreline anglers		# of Boat anglers		Total # of anglers	Brook Trout caught				Brown Trout caught				Rainbow Trout caught				Total trout caught	Angler comments / Interviewer observations
										<14 in		>14 in		<14 in		>14 in		<14 in		>14 in			
					adult	child	adult	child		kept	rel	kept	rel	kept	rel	kept	rel	kept	rel	kept	rel		
Cumberland	Shaws Mill Pond	Choppy	3	8:00	35	4	20	2	61	0	0	0	0	0	0	0	0	9	0	0	0	9	Very unusual slow day fishing and anglers questioned if pond was stocked. (Steve Krumm, WCC)
				9:00	35	7	28	2	72														
				10:00	27	7	24	2	60														
				11:00	18	3	14	1	36														
				12:00	18	3	14	1	36														
Essex	Branch Brook Park Pond	Choppy	0	8:00	6	0	0	0	6	0	0	0	0	0	0	0	0	12	8	0	0	20	(Lauren Wasserman, WCC)
				9:00	5	0	0	0	5														
				10:00	13	0	0	0	13														
				11:00	10	1	0	0	11														
				12:00	11	0	0	0	11														
Essex	Diamond Mill Pond	Clear	0	8:00	30	0	0	0	30	0	0	0	0	0	0	0	0	9	37	2	0	48	Most anglers ready at 7:45AM, kids came in past 11AM. No pure catch & release anglers, would keep a few. Most do fall fishin but not here, water quality bad by late summer. (Hung V Le, WCC)
				9:00	30	0	0	0	30														
				10:00	28	0	0	0	28														
				11:00	19	0	0	0	19														
				12:00	15	5	0	0	20														
Essex	Verona Park Pond	Muddy/ Choppy/ High Water	3	8:00	109	13	0	0	122	0	0	0	0	4	0	0	0	33	6	0	0	43	Fish last fall too small, request bigger. Request Golden Trout. Powerbait is working, lures not. Request increase amount allowed per person. Can reduce fall creel to 3 but 2 is too low. Request far better maintenance around this lake (Jillian Agrello, WCC)
				9:00	95	12	0	0	107														
				10:00	100	6	0	0	106														
				11:00	103	5	0	0	108														
				12:00	106	6	0	0	112														
Gloucester	Grenloch Lake	Clear/ Choppy	0	8:00	35	15	24	5	79	0	0	0	0	0	0	0	0	15	0	1	0	16	Very windy day, not much biting. A few people said that Grenloch Lake hasn't been the same since the fuel spill a few years ago (Jeff Bower, WCC)
				9:00	32	13	20	2	67														
				10:00	22	8	12	2	44														
				11:00	17	5	8	0	30														
				12:00	17	5	5	0	27														
Hunterdon	Amwell Lake	Muddy/ Choppy	5	8:00	25	8	6	0	39	0	0	0	0	0	0	1	0	14	0	0	0	15	Tough conditions, extremely windy and cold conditions drove most away early. Power bait did well for the successful anglers, but largest wa caught on spinner. (Jim Kinney, WCC)
				9:00	18	4	6	0	28														
				10:00	14	2	4	0	20														
				11:00	8	1	2	0	11														
				12:00																			
Hunterdon	Manny's Pond	Muddy/ Choppy	0	8:00	21	6	0	0	27	0	0	0	0	0	0	0	0	1	0	0	0	1	Upon arrival at 7:40 AM anglers already had lines in water including 5 kids. As wind increased, people started leaving. (Barbara Wingel, WCC)
				9:00	16	5	0	0	21														
				10:00	8	0	0	0	8														
				11:00	3	0	0	0	3														
				12:00	3	0	0	0	3														
Mercer	Colonial Lake	Muddy/ Choppy	46	8:00	25	3	0	0	28	0	0	0	0	0	0	0	0	1	0	0	1	2	Weather increasingly windy as morning progressed, strong gusts creating waves on the lake. Some fishermen were willing to talk. Similar disgruntled comments about the presence of cormorants, seems they always show up on stocking day. (Heather Aupperle, WCC)
				9:00	22	4	0	0	26														
				10:00	21	4	0	0	25														
				11:00	19	2	0	0	21														
				12:00	17	0	0	0	17														

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County	Waterbody	Lake/ River Conditions	# of Cormorants Present	Time	# of Shoreline anglers		# of Boat anglers		Total # of anglers	Brook Trout caught				Brown Trout caught				Rainbow Trout caught				Total trout caught	Angler comments / Interviewer observations
										<14 in		>14 in		<14 in		>14 in		<14 in		>14 in			
					adult	child	adult	child		kept	rel	kept	rel	kept	rel	kept	rel	kept	rel	kept	rel		
Mercer	Rosedale Lake	Muddy/ Choppy/ High Water	6 to12	8:00	26	5	0	0	31	0	0	0	0	0	0	1	0	4	0	0	0	5	Mostly bait fishing, lots had multiple lines out. Very windy, folks started leaving, core group of 10-15 adults stayed most of morning. Trout were not rising/feeding. Not many trout caught. Lots of cormorants. One large brown caught. (Caitie Caroleo, WCC)
				9:00	29	6	0	0	35														
				10:00	20	3	0	0	23														
				11:00	11	2	0	0	13														
				12:00	13	4	0	0	17														
Mercer	Stony Brook	Clear	0	8:00	11	1	0	0	12	0	0	0	0	0	0	0	0	4	0	0	0	4	"Could be the onl fish of the day", "Did they stock it with only one?", "This is ridiculous!" "Are there any?" (Chris Reutlinger, WCC)
				9:00	14	1	0	0	15														
				10:00	5	1	0	0	6														
				11:00	4	0	0	0	4														
				12:00	4	1	0	0	5														
Middlesex	Lake Papaianni	Muddy/ Choppy	2	8:00	4	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	No one was catching any trout. One guy I talked to caught a largemouth bass. (Chris Ambrose, WCC)
				9:00	4	0	0	0	4														
				10:00	4	2	0	0	6														
				11:00	5	2	0	0	7														
				12:00	0	0	0	0	0														
Middlesex	Roosevelt Park Pond	Muddy/ Choppy	25	8:00	43	10	0	0	53	0	0	0	0	0	0	0	0	0	0	1	0	1	Water quality measured: Two different water temperatures read 12.8 C and 12.4 C (Shawn Crouse, NJDFW)
				9:00	-	-	-	-	-														
				10:00	23	5	0	0	28														
				11:00	12	2	0	0	14														
				12:00	7	3	0	0	10														
Monmouth	Echo Lake	Choppy	3	8:00	59	8	2	2	71	0	0	0	0	0	3	1	0	21	11	15	0	51	Nice sunny day but alot of wind. Did not deter anglers. Lots of people complained about cormorants. They pointed out the browns that were being caught since it has been stated only rainbows were stocked this year. Iconfirm that there were a few browns caught (Anthony Acetta, WCC)
				9:00	85	11	2	2	100														
				10:00	46	7	2	2	57														
				11:00	35	5	0	0	40														
				12:00	30	6	0	0	38														
Monmouth	Holmdel Park Pond	Choppy/ Muddy	3 to 5	8:00	61	25	0	0	86	0	0	0	0	0	0	0	0	42	8	3	0	53	Two broodstock caught very early. Slow but consistent fishing. Crowds cleared out at 8:45. (Charles Sedor, NJDFW)
				9:00	64	20	0	0	84														
				10:00	62	7	0	0	69														
				11:00	46	7	0	0	53														
				12:00	27	5	0	0	32														
Monmouth	Spring Lake	Choppy/ Clear	2	8:00	75	80	7	2	164	-	-	-	-	-	-	-	-	-	-	-	-	~300	Childrens fishing tournament, club member was to email fish caught totals. Estimated 40-500 children and 300 fish caught. Want more fish stocked (Kathy Collins, WCC)
				9:00	-	-	-	-	~600														
				10:00	-	-	-	-	0														
				11:00	-	-	-	-	0														
				12:00	-	-	-	-	0														
Morris	Burnham Park Pond	Choppy	2	8:00	42	12	0	0	54	0	0	0	0	0	0	0	0	35	0	0	1	36	Some complaints regarding no 2015 stocking signs. Fish seem to be concentrated near dam. Dwindling numbers toward noon due to wind. Many use web site for stocking info. (Michael Sankowich, WCC)
				9:00	45	15	0	0	60														
				10:00	27	5	0	0	32														
				11:00	16	9	0	0	25														
				12:00	10	5	0	0	15														

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County	Waterbody	Lake/ River Conditions	# of Cormorants Present	Time	# of Shoreline anglers		# of Boat anglers		Total # of anglers	Brook Trout caught				Brown Trout caught				Rainbow Trout caught				Total trout caught	Angler comments / Interviewer observations
										<14 in		>14 in		<14 in		>14 in		<14 in		>14 in			
					adult	child	adult	child		kept	rel	kept	rel	kept	rel	kept	rel	kept	rel	kept	rel		
Morris	Lake Musconetcong	Muddy/ Debris	0	8:00	16	4	0	0	20	0	0	0	0	0	1	0	0	4	3	0	0	8	Lake frozen, no boats. Anglers think fish washed downstream due to rain (Megan Lade, WCC)
				9:00	19	4	0	0	23														
				10:00	18	3	0	0	21														
				11:00	16	0	0	0	16														
				12:00	16	0	0	0	16														
Morris	Rockaway River	Choppy/ High water	0	8:00	6	1	0	0	7	0	0	0	0	0	0	0	0	2	0	0	0	2	Main Street Bridge: covred from about 500' upstream from bridge down to below falls. Lots of anglers, little action observed. (Hugh Merritt, WCC)
				9:00	8	3	0	0	11														
				10:00	0	0	0	0	0														
				11:00	0	0	0	0	0														
				12:00	0	0	0	0	0														
Morris	Rockaway River	Choppy/ High water	0	8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	3	Covered from falls 250' downstream from bridge/Main Street to Powersville Road "T". (Hugh Merritt, WCC)
				9:00	9	0	0	0	9														
				10:00	5	2	0	0	7														
				11:00	0	0	0	0	0														
				12:00	0	0	0	0	0														
Morris	Rockaway River	Choppy/ High water	0	8:00	17	3	0	0	20	0	0	0	0	0	0	0	0	9	1	3	0	13	Boonton: orderly but crowded - 2 main groups (1) the area right down from the access rod (2) the area "opposite" the wall further downstream. (Hugh Merritt, WCC)
				9:00	21	0	0	0	21														
				10:00	0	0	0	0	0														
				11:00	0	0	0	0	0														
				12:00	0	0	0	0	0														
Morris	Speedwell Lake	Choppy	0	8:00	30	2	0	0	32	0	0	0	0	0	0	0	0	34	2	0	0	36	Grand totals are only from anglers I was able to survey. There were fly fishermen below the falls that were catching fish but I was not able to survey or observe if they were keeping them. (Robert Bodnar, WCC)
				9:00	28	1	0	0	29														
				10:00	16	3	0	0	19														
				11:00	14	3	0	0	17														
				12:00	-	-	-	-	-														
Ocean	Lake Shenandoah	Muddy/ Choppy	9	8:00	15	0	0	0	15	0	0	0	0	0	0	0	0	1	0	0	0	1	Cormorants were feeding early in the morning. Extremely windy, hard to stand. Comments from most anglers foucsed on the wnd. They blamed the lack of biting fish on the wind. Anglers changed position because of wind but still no success. (Joanna Peluso, WCC)
				9:00	14	0	2	0	16														
				10:00	10	3	2	0	15														
				11:00	11	3	0	0	14														
				12:00	4	1	0	0	5														
Somerset	Spooky Brook Pond	Choppy	4	8:00						0	0	0	0	0	0	0	0	6	28	2	0	36	Angler survey was very productive. Many adult and youth anglers were present despite very strong, steady winds. Majority of anglers caught nothing, got bites, or caught 1or 2 fish less than 14 inches. (James Lesnefsky, WCC)
				9:00	33	7	0	0	40														
				10:00	28	6	0	0	34														
				11:00	24	4	0	0	28														
				12:00	24	9	0	0	33														
Sussex	Alms House Pond		0	8:00	-	-	-	-	-	0	0	0	0	0	0	0	0	4	0	0	0	4	Vey windy, water temp 5.5°(Pat Hamilton, NJDFW)
				9:00	-	-	-	-	-														
				10:00	7	0	0	0	7														
				11:00	-	-	-	-	-														
				12:00	-	-	-	-	-														

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										<14 in		>14 in		<14 in		>14 in		<14 in		>14 in			
					adult	child	adult	child		kept	rel	kept	rel	kept	rel	kept	rel	kept	rel	kept	rel		
Sussex	Paulins Kill River	Higher than normal, slightly off color	0	8:00	43	3	0	0	46	1	0	0	0	0	0	0	0	~20	0	0	0	21	Anglers on Paulins Kill did well in the beginning in the upper section, but not as well further downstream (below the park in Lafayette). (Pat Hamilton, NJDFW)
				9:00	22	2	0	0	24														
				10:00	6	0	0	0	6														
				11:00	14	0	0	0	14														
				12:00	0	0	0	0	0														
Sussex	Stony Lake	Ice covered	0	8:00	-	-	-	-	-	0	0	0	0	0	0	0	0	0	0	0	0	0	Reported to be ice covered (Kent Becker, WCC)
				9:00	-	-	-	-	-														
				10:00	-	-	-	-	-														
				11:00	-	-	-	-	-														
				12:00	-	-	-	-	-														
Union	Nomahegan Pond		0	8:00	35	10	0	0	45	0	0	0	0	0	0	0	0	5	0	0	0	5	Reported 10 < 14", 2 > 14" RBT but not seen. Saw few trought caught or on stringers. Weather raw, turnout low. Last year this palce was packed, not this year. Serious guys on Rahway River. Comments about bad fishing and cold weather. (Tom Karakowski, WCC)
				9:00	-	-	-	-	-														
				10:00	25	5	0	0	30														
				11:00	-	-	-	-	-														
				12:00	20	3	0	0	23														
Warren	Blair Lake	Choppy/ High water	1	8:00	10	4	0	0	14	0	0	0	0	0	0	0	0	6	5	0	1	12	Cold and windy, fish not biting, difficult to cast, very few fish caught. Very close on who wanted less but larger fish and who wanted more but smaller. Families tended to more but smaller. Most left by 10, 1/2 said they were going to fish downstream. (Marie Ciaffa, WCC)
				9:00	21	10	0	0	31														
				10:00	14	4	0	0	18														
				11:00	4	1	0	0	5														
				12:00	3	0	0	0	3														
Warren	Columbia Lake	Clear	5	8:00	5	0	4	0	9	0	0	0	0	0	0	0	0	0	15	0	0	15	Water calm and slightly clear frm shoreline. Clouds broke around 7:30AM. Cormorants flying above lake but didn't see any feeding. One angler caught 4 Rainbow right above the dam. (Sean McBride, WCC)
				9:00	8	1	5	0	14														
				10:00	8	1	5	0	14														
				11:00	8	1	3	0	12														
				12:00	2	2	0	0	4														
Warren	Columbia Lake (below dam)	Clear	0	8:00	6	0	0	0	6	0	0	0	0	0	0	0	0	0	1	0	0	1	Interview anglers at 8:00 AM and came back to location at 11:00 AM at which time they left, so do not know what tey caught. At that time, only 1 angler caught 1 Rainbow. (Sean McBride, WCC)
				9:00	0	0	0	0	0														
				10:00	0	0	0	0	0														
				11:00	1	0	0	0	1														
				12:00	1	0	0	0	1														
Warren	Furnace Lake	Frozen	0	8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	No anglers on this day. Lake was still ice ocvered. (John Feltovic, WCC)
				9:00	0	0	0	0	0														
				10:00	0	0	0	0	0														
				11:00	0	0	0	0	0														
				12:00	0	0	0	0	0														
Warren	Mountain Lake	Lake 95% frozen	0	8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7:30 AM one boat pulled in parkinglot with PA plates. Saw lake was frozen and left, didn't get out of vehicle. No shoreline anglers. (Joseph Dante, WCC)
				9:00	0	0	0	0	0														
				10:00	0	0	0	0	0														
				11:00	0	0	0	0	0														
				12:00	0	0	0	0	0														

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					adult	child	adult	child		kept	rel	kept	rel	kept	rel	kept	rel	kept	rel	kept	rel		
Warren	Musconetcong River (Stephens St. Park)	High Water	0	8:00	27	8	0	0	35	1	0	0	0	0	0	0	0	35	14	2	0	52	Not many anglers interested in taking the survey. Was asked a number of times if river was stocked. (Rick Ege, WCC)
				9:00	40	4	0	0	44														
				10:00	35	2	0	0	37														
				11:00	30	1	0	0	31														
				12:00	10	1	0	0	11														
Warren	Paulins Kill River	High Water	0	8:00	-	-	-	-	-	0	0	0	0	0	0	0	0	25	10	3	1	40	(Willi Huber and Ed Sinning, WCC)
				9:00	-	-	-	-	-														
				10:00	-	-	-	-	-														
				11:00	-	-	-	-	-														
				12:00	-	-	-	-	-														
Warren	Pohatcong Creek	Clear/ Choppy	0	8:00	15	0	0	0	15	0	0	0	0	1	2	1	3	4	4	13	4	32	Fishing activity picked up at times but mostly slow day. (John Feltovic, WCC)
				9:00	16	0	0	0	16														
				10:00	4	4	0	0	8														
				11:00	2	0	0	0	2														
				12:00	0	0	0	0	0														