Coldwater Fisheries Management Plan

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

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Investigations and Management of New Jersey's Freshwater Resources

Job II-6   Development of a Coldwater Fisheries Management Plan

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Principal Authors

Patricia L. Hamilton, Principal Fisheries Biologist
Lisa Barno, Bureau Chief

Contributing Authors

Ed Washuta, Fish Pathologist
Jeff Matthews, Superintendent
Craig Lemon, Superintendent
Mark Boriek, Principal Fisheries Biologist
Robert Papson, Principal Fisheries Biologist

Map Production

Andrea Ostroff, Wildlife Worker

Additional Assistance

Michelle Ruggiero, Seasonal Worker
Scott Ward, Seasonal Worker
Hugh Carberry, Supervising Biologist
Shawn Crouse, Assistant Biologist
Christopher Smith, Assistant Biologist
Carole Delibero, Principal Clerk Typist
James Hartobey, Seasonal Worker

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Introduction

New Jersey's coldwater streams and lakes come in a variety of shapes and sizes, and offer an array of habitats for animal, plant, and microbial life. Fish species such as trout, that inhabit and prefer waters with relatively cold temperatures, 4 –15°C (40-60°F), are often referred to as coldwater fishes. The emphasis in this plan is placed on managing New Jersey's salmonid (trout) fisheries because they are widely recognized as indicators of high water quality, and are important recreational game fish. Efforts to conserve, protect, and manage trout and their habitats are beneficial not only to other aquatic organisms that co-exist with trout, but to downstream biotic communities as well.

The Department of Environmental Protection's Division of Fish and Wildlife is the primary agency entrusted with protecting and managing the state's fish and wildlife. Trout management in New Jersey dates back to the late 1800's when the New Jersey Fish Commission planned to re-stock natural trout streams believed to have been decimated by a severe drought. The state's first fish hatchery was constructed in 1912 to produce trout in response to a growing demand. Since that humble beginning, trout management within the state has evolved into efforts to protect water quality and in-stream habitat and enhance seasonal and year round trout fishing opportunities for anglers through two modern fish culture facilities. Anglers help support agency research and management activities through the purchase of fishing licenses and trout stamps. While many of the Division's fish management efforts benefit the angler, the state's eight million residents also reap the benefits of resource protection and preservation efforts. In addition, the pursuit of freshwater fishing in New Jersey generates over 138 million dollars annually into the state's economy.

Despite the long history and evolution of trout management within the state there has never been a long term, strategic plan formulated to address the myriad of issues surrounding the state's fragile coldwater resources. The lack of long range goals and objectives leads to a "reactionary" approach to fisheries management. New Jersey is the fourth smallest state in the union, the most densely populated, and is currently undergoing rapid changes in land uses. The development of this plan is crucial to providing for the long term protection of coldwater resources and providing for its most optimal use. The plan also coincides with the Department's on-going initiative in protecting the state's waterways. This initiative most recently resulted in substantially increasing buffers on trout production streams through changes in stormwater management rules. These comprehensive rules play an integral role in the protection of the water quality and critical habitat of important indicator species such as trout.

For the first time an information base specific to New Jersey's trout resources has been compiled into a single reference document. The information contained in the Coldwater Fisheries Management Plan (CWFMP) has been organized into sections that can be readily referenced and used by a broad audience that includes resource managers and regulators, anglers, conservation organizations, consultants, and landowners. This Plan documents the evolution of trout management practices in NJ over the last century and identifies coldwater issues, goals and strategies in the areas of fish culture, habitat protection, fish health, regulations and stocking practices. Most importantly, it provides a mechanism for implementing these strategies by establishing an operational plan for the next five years.

Since social as well as biological factors play an important role in the management of the State's aquatic resources a draft version of the plan was released for public comment in February 2004. A public meeting was held on April 3, 2004. Due to the magnitude of the document, several extensions were granted for the comment period. Public comments have been incorporated in this final document.

The CWFMP is not static and should be considered a work in progress, subject to change as warranted by changes in environmental or social pressures on New Jersey's coldwater resources, or advances in fisheries management techniques. Updates to the CWFMP will be noted in this document at the end of each appropriate section. In addition, these updates, as well as summaries of activities and actions related to coldwater fisheries management, will appear in the Addendum to the plan.

History of Trout Management in New Jersey

Overview

Trout management in New Jersey has evolved from efforts to re-establish decimated brook trout populations in the late 1800's, to protecting water quality and managing waters statewide to provide seasonal and year round trout fishing opportunities. These opportunities have been enhanced since the 1980's by the availability of trout reared at the DFW's modern fish culture facilities and implementation of a variety of angling regulations. Research conducted by the DFW lead to the development of a classification system for New Jersey's freshwaters. This classification system is recognized in state regulatory programs governing water quality and land development, which significantly aids in the protection of coldwater resources. The history of trout management in New Jersey is described below and summarized in a timeline at the end of this narrative.

1879 – 1959

Trout management in New Jersey officially dates back to the late 1800's. In response to a devastating drought in 1875, the New Jersey Fish Commission (the forerunner of the present day Fish and Game Council) planned to re-stock the state's "natural trout streams." The objective was to re-establish trout populations in streams where they had been depleted. From 1879 through 1881 the Commission stocked a total of 416,800 fingerling brook trout. By that time, trout stocking by private fishing clubs had long since been underway. In 1882 the Commission made the first recorded stocking of rainbow trout, with 7,000 fish divided between the Musconetcong, Pequest, and Paulinskill Rivers.

Frequent requests for waters to be replenished with trout ensued, causing the Commission to issue the following statement in their Annual Report of 1885:

> The wardens and interested persons have frequently requested that certain waters be replenished with trout and applications are constantly being made to the Commissioner to supply designated streams with fish, but they have seriously questioned the advisability of making further expenditures of public money for the propagation of a fish that can hardly be expected to furnish food for the masses, and which can only be looked upon as a luxury for the almost exclusive pleasure of the few who can command time and wealth to expend upon their pursuit.

However, in 1906 the Commission relented and purchased 45,000 trout from the Paradise Brook Trout Company located in Henryville, PA. Experimental stockings of brown trout, obtained from Seth Greene's hatchery in Caledonia, NY, began in 1908 in the South Branch Raritan and Millstone Rivers. In 1909, the Commission authorized contracts for the purchase of over 100,000 trout and one year later recommended construction of a state fish hatchery. The State Fish Hatchery at Hackettstown was built and production of fingerling brook trout began 1912. One year later, rainbow and brown trout were added to hatchery production. In 1914 the hatchery began rearing catchable

size brook, brown, and rainbow trout for liberation statewide. By 1932 production had risen to a little over half a million trout.
Meanwhile an extensive inventory of the state's trout resources was being conducted from 1918 –1920 under the direction of four biologists (W.T. Foster, F.N. Miller, H.E. Schradieck, and H.M. Spandau). Subsequently, as interest in trout stocking heightened with the advent of a state fish hatchery, research and inventory work was relegated to a minor role until the 1950's. In 1950 the Lake Survey Unit was assimilated into Bureau of Fisheries Laboratory which then became responsible for trout research and management activities.

At the federal level, the Federal Aid in Sport Fish Restoration (Public Law 81-6810), popularly known as the Dingell-Johnson (D-J) Act was enacted in 1950, imposing a manufacturers excise tax on recreational fishing equipment. Revenues generated by the tax provided a funding base to states for sportfish research, aquatic education, and aquatic habitat protection and restoration. In 1953, New Jersey initiated a trout stamp to help cover the costs associated with hatchery trout production. Licensed anglers were required to purchase a trout stamp ($1 annually) in order to fish for trout.

1960 – 1989

In 1962 the Bureau initiated a project, Research in Trout Management (Project F-20-R), using Federal Aid in Sport Fish Restoration funds. Project objectives initially were to determine causes of trout mortality, and to conduct investigations into the possibility of improving trout fishing by introduction of new species (or strains), and employment of new techniques and procedures. In 1964 the first water quality standards were adopted by a New Jersey State agency (Department of Health) which included a special provision for trout waters.

Over a five-year period (1968 – 1972), the Bureau of Fisheries conducted an intensive statewide stream survey under F-20-R to develop a stream classification system. In 1973 a comprehensive classification of the state's trout waters, based upon stream data collected under a five-year study, was developed. In the meantime, the Department of Environmental Protection was created (1970) and this agency's surface water quality standards began distinguishing between "trout production," "trout maintenance," and "nontrout" waters. The Bureau's classification of trout waters was refined and later formally recognized in 1981 under the newly adopted state Surface Water Quality Standards.

A new facet was added to the trout program in 1976, when lake trout eggs were brought into the Charles O. Hayford State Fish Hatchery (formerly known as the State Fish Hatchery at Hackettstown). The following year, fingerling lake trout were released into Round Valley Reservoir. The first special regulation governing angling for wild trout was adopted in 1979 when a section of Van Campens Brook was designated a Natural Trout Fishing Area.

In 1980 construction of the Pequest Trout Hatchery began. Fish production at this fish culture facility commenced in the fall of 1982 when fertilized eggs were obtained from several federal hatcheries. The production of all trout, except lake trout, shifted from the

Hackettstown Hatchery to the more modern Pequest Trout Hatchery the following year. With the improved trout production capabilities of the new hatchery it was possible to expand the traditional spring trout stocking program to include a fall stocking program that commenced in 1984. In 1983 trophy trout regulations were adopted for Round Valley Reservoir to protect the developing lake trout fishery and limit the harvest of trophy brown and rainbow trout. Another new regulation, Trout Conservation Area, was adopted for a portion of the Pequest River in 1988 to provide anglers with a quality angling experience for catchable trout. Merrill Creek Reservoir was completed in 1988 and stocked with trout (initially rainbow and lake), alewives and smallmouth bass.

1990 – 2005

Trout management took a giant leap forward in 1990 with the establishment and refinement of a variety of special trout regulations and adoption of a new allocation methodology for distributing hatchery-reared trout. The stocking allocation plan provided an equitable basis for determining trout stocking quotas on nearly 200 waters, by using measurable characteristics to determine individual allocations and frequency of stocking. To conserve naturally reproducing trout populations, Wild Trout Stream regulations were adopted for 29 streams. The Trout Conservation Area regulation was split into a seasonal and year round regulations and sections on other streams were added. Another regulation, Major Trout-Stocked Lakes (later renamed Holdover Trout Lakes), was also established for lakes that provide a fishery for holdover trout.

In 1996 the NJDFW's first trout habitat improvement project was initiated on the Musconetcong River, with the assistance of volunteers from the DFW's Wildlife Conservation Corps and Trout Unlimited. A statewide minimum size limit (7 inches) for trout was imposed in 1997 to conserve naturally reproduced trout in streams not regulated as Wild Trout Streams. In 1998 two new programs, "Hook a Winner" and the "Sea-Run Brown Trout," were initiated.

As the new millenium unfolded, many environmental, social, and economic challenges faced New Jersey's coldwater fisheries managers, who responded with new initiatives in trout research, management, and culture. The NJDFW began investigating wild brook trout genetics to determine if existing populations descended from brook trout that colonized New Jersey following deglaciation. A five-year study involving the re-inventory of trout streams that were surveyed 30 years earlier was also initiated.

In 2001 the trout-stocking program was further expanded into a "Winter Trout Program" on 24 lakes, using catchable-size rainbow trout. Responding to anglers' requests for more brown trout, beginning in 2003 the Pequest Trout Hatchery adjusted production by taking more brown trout (and less rainbow trout) eggs. The *Bonus Broodstock* program was instituted in the spring of 2004 to generate excitement and stimulate more people to try trout fishing, by stocking greater numbers of big trout in selected waters. Also that year the number of stockings on Year Round Trout Conservation Areas was increased, from two to three times following opening day.

In December 2004, in response to declining license sales, the DFW released a proposal that involved the most significant changes to its trout program since the adoption of the trout allocation methodology in 1990 (Appendix A). In this proposal the following broad scale changes were recommended: re-allocation of trout from seven large, warmwater lakes over 100 acres, to smaller waterbodies; modification of the spring stocking schedule so that all non-holdover lakes and ponds would be stocked earlier in the season; an increase in the average size of the trout stocked during the fall and winter, from 9-10" to 14-16", which would be offset by a substantial decrease in the number of trout stocked under those two programs; and the cessation of stocking on six small streams having wild brook trout populations. Following a three-month public comment period, during which over 1,000 comments were received, the proposal was modified and adopted by the Fish and Game Council. New trout-stocked waters added to program, and those discontinued required Fish Code amendments that take effect in 2006.

As a result of this proposal, the spring 2005 stocking schedule was modified so that 70 warmwater ponds and lakes were stocked during the week immediately following opening day. This change provided provide anglers with more opportunities to fish for trout earlier in the spring season when interest is still high and waterbody conditions are typically more conducive for trout. The fall 2005 trout stocking schedule was reduced from three to two weeks, because surplus fish traditionally stocked the third week had to be stocked earlier in the season to provide room in the hatchery to raise the larger fish for the 2006 season.

In 2005 more catchable-size brown trout were stocked during the spring as a result of a change in hatchery production initiated in 2003. A comprehensive Coldwater Fisheries Management Plan, which contained an information base and established goals and strategies to guide future decision making, was finalized and implemented.

Year		Events Related to Trout Management in New Jersey
1879	-	Fish and Game Commission began stocking brook trout in "natural trout streams" that had been severely affected by the drought of 1875.
1882	-	First recorded stocking of rainbow trout.
1908	-	First recorded stocking of brown trout First licensing of non-resident anglers.
1909	-	First licensing of resident anglers ($1.15 per person, annually). Contracts went out for the purchase of over 100,000 trout.
1910	-	Construction of a state fish hatchery recommended.
1912	-	The State Fish Hatchery at Hackettstown began propagation of brook trout.
1913	-	Brown and rainbow trout added to hatchery production.
1914	-	The state's trout stocking program shifted from fingerling to catchable-sized trout.
1918	-	Statewide survey of streams conducted for trout management purposes.

1950 - Bureau of Freshwater Fisheries Laboratory (originally the Lake Survey Unit) created and the application of its research to trout management began.

The Federal Aid in Sport Fish Restoration (Public Law 81-6810), a.k.a. the Dingell-Johnson (D-J) Act was enacted. The revenue from a 10% excise tax, imposed on recreational fishing equipment, provided a funding source for states' sportfish restoration efforts.

1953 - Initiated a special trout stamp, costing $1, to help defray rising trout propagation costs, increase hatchery trout production, and orient program costs more towards trout anglers.

1959 - State Fish Hatchery at Hackettstown renamed the Charles O. Hayford State Fish Hatchery in honor of its first supervisor who served there until 1955.

1961 - Freshwater Fisheries Lab at Lebanon was constructed.

1962 - Grant Project F-20-R, *Research in Trout Management* (funded under the D-J Act) initiated and the application of its findings to trout management began.

1963 - Pequest Trout Rearing Station along Pequest River began production.

1964 - The first water quality standards adopted by a New Jersey state agency (Department of Health) that included a special provision for trout waters.

1968 - Initiated a five-year study involving the collection of stream data under D-J Grant F-20-R, Research in Trout Management).

Round Valley Reservoir completed and opened to fishing.

1970 - New Jersey's Department of Environmental Protection was created.

1973 - First comprehensive classification of the state's trout waters, based upon stream data collected under F-20-R, Research in Trout Management).

1977 - First recorded stocking of lake trout (stocked in Round Valley Reservoir).

1979 - *Natural Trout Fishing Area* regulation established on Van Campens Brook

1980 - Construction of the Pequest Trout Hatchery and Natural Resource Education Center in Warren County commenced.

1981 - Statewide *Surface Water Quality Standards* adopted which classified the majority of the state's fresh surface waters according to their ability to support trout, and applied corresponding quality criteria.

1982 - Pequest Trout Hatchery began production of trout.

Trophy Trout Lake regulations were adopted for Round Valley Reservoir

1983 - Trout production shifted from the Charles O. Hayford State Fish Hatchery at Hackettstown to the Pequest Trout Hatchery (with the exception of lake trout) and Pequest Rearing Station closed.

NJDEP implemented comprehensive statewide stream encroachment regulations (Flood Hazard Area Control Act) governing construction activities in and adjacent to waterways were which included special provisions for the protection of trout waters.

1984 - First trout reared at the Pequest Hatchery released in New Jersey lakes and streams.

Fall Trout Stocking Program initiated.

1986 - First "Free Fishing Days" held.

1988 - *Trout Conservation Area* regulation established on a section of the Pequest River in the vicinity of the hatchery.

Merrill Creek Reservoir completed and stocked with trout, smallmouth bass and alewives.

1990 - Implemented the Trout Stocking Improvement Plan to provide an equitable basis for determining trout allocations by using measurable characteristics of all the state's trout stocked waters.

Wild Trout Stream, *Year Round Trout Conservation Area*, and *Major (Holdover) Trout-Stocked Lake* regulations adopted.

1992 - Brook trout officially designated as the NJ State Fish.

1996 - Initiated an in-stream fish habitat improvement project on a section of the Musconetcong River.

1997 - For the first time in 46 years, a minimum size limit (7 inches) on trout statewide adopted to protect small trout (wild and stocked) from being harvested by anglers.

1998 - *Hook a Winner Program* initiated (1,000 brook trout were jaw tagged).

Modified the spring trout-stocking program to include 8 small, public, urban ponds that were stocked one time (during the pre-season period).

The *Sea-Run Brown Trout Program* was initiated in the Manasquan River.

2000 - Initiated a study to characterize wild brook trout populations in New Jersey streams using molecular genetics.

A study to re-inventory and assess trout production streams previously sampled in 1968 – 1973 was initiated.

2001 - Minimum age for a fishing license and trout stamp raised from 14 to 16 years of age.

W*inter Trout Stocking Program* initiated on 24 lakes statewide to enhance trout angling opportunities in late fall and winter.

2003 - Production of brown trout at the Pequest Trout Hatchery increased by 25,000 and rainbow trout production decreased by the same amount.

Annual public fisheries forums were initiated to provide anglers with additional opportunities to comment on the DFW's research, management and culture activities.

2004 - *Bonus Broodstock Trout* program implemented for select small ponds and lakes under the spring trout stocking program.

Additional in-season stocking of brown trout (during Week 5) initiated for designated Year Trout Conservation Areas.

Proposal incorporating significant changes to the DFW's trout stocking program was released for public comment. Proposed changes included discontinuation of trout stocking at seven large, non-holdover lakes and the re-allocation of trout to new waters (small lakes and ponds); modification of the spring stocking schedule for warmwater lakes; an increase the size, and reduction in the number, of trout stocked for the fall and winter stocking seasons; and cessation of stocking in six small streams inhabited by wild brook trout.

Winter trout stocking schedule, for south Jersey lakes, was changed from early January to the third week of November.

2005 **-** Trout proposal modified after public comment and adopted by the Fish and Game Council, and changes to be phased in over 2005 and 2006.

Spring trout stocking schedule was modified to shift the stocking of 70 ponds and lakes statewide to one week earlier, commencing the week immediately following the opening day weekend.

More brown trout (25,000 more) released during the spring stocking program as a result of a Pequest Trout Hatchery production change, initiated in 2003.

Fall trout stocking reduced to a two-week period.

Statewide Coldwater Fisheries Management Plan finalized.

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Trout Life History and Ecology

Overview

New Jersey is inhabited by a variety of fish species that spend all or part of their life cycle in freshwater (Appendix B). The salmonid family of fishes is currently represented in New Jersey by four species: brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*) and lake trout (*Salvelinus namaycush*). Of these four only the brook trout is native to New Jersey. Stocking practices dating back to the late 1800's have resulted in the establishment of reproducing populations of nonnative brown and rainbow trout in a number of suitable New Jersey streams. Lake trout, another nonnative salmonid, was more recently introduced in New Jersey in 1997.

New Jersey's trout streams are generally characterized as cool, clear, waters with a coarse substrate. The majority of these streams flow through the two northern physiographic provinces, the Ridge and Valley Province and Highlands Province and a small portion of the adjacent Piedmont Province. Headwater streams in these areas are typically conducive to the survival of trout and fish species associated with trout. Cover, which can be presented in many forms, is an important habitat component for trout. Diverse in-stream habitat, represented by a mix of pool, riffle and slow moving deeper areas known as runs, are also important for various life stages.

Loss of habitat, reduced flows, sedimentation, and increased temperatures from resulting land use changes are just a few of the problems facing New Jersey's trout populations. Brook, brown, and rainbow trout, and sculpins, are intolerant of habitat and water quality impacts making them quite useful as indicators. The State's current stream classification system is based on the presence of trout and trout associated species. Although trout production streams receive additional protection through the State's Land Use Program and Surface Water Quality Standards impacts from land use changes are not prevented. The cumulative effect of these impacts is not always obvious, in that there is direct mortality, nonetheless, they have significant and long-term detrimental impacts to fish populations. Understanding the specific chemical, physical and biological needs of trout through their various life stages is essential as this information will provide the basis for the development of specific protective and/or corrective measures for damage to trout streams.

Presented in this section are general life history and ecology information for three salmonid species (brook, brown and rainbow trout) and conditions which should be maintained if trout are to survive. Life history charts, which summarize general information for each trout and trout-associated species found in New Jersey streams, are included at the end of this section. Technical information stated in this section, and the accompanying life history sheets regarding habitat requirements, are primarily supported by scientific literature summarized in the United States Fish and Wildlife Service habitat suitability index models developed for individual species. There is a vast array of information relating to specific habitat requirements for salmonids, which goes beyond the scope of this document.

Occurrence and Distribution

The salmonid family of fishes is represented in New Jersey by four species: brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), rainbow trout (*Oncorhynchus mykiss*) and lake trout (*Salvelinus namaycush*). Of these four species only the brook trout is native to New Jersey. However, naturally reproducing populations of brown and rainbow trout have become established in suitable New Jersey waters where they have been historically stocked. The lake trout, a lake dwelling fish, was introduced to Round Valley Reservoir (1977) and Merrill Creek Reservoir (1988). Natural reproduction of lake trout was documented in 1985 in Round Valley Reservoir and the trophy fishery is now maintained through natural reproduction.

The distribution of the three stream-dwelling trout species can generally be related to the physiography of the state. The majority of New Jersey's trout streams flow through two northern physiographic provinces, the Ridge and Valley Province and Highlands Province and a portion of the adjacent Piedmont Province (Figure 1). Headwater streams in these areas are typically cool, clear, and high gradient in nature with rock cobble substrate conducive to trout and trout associated species. However, trout production and trout maintenance stream segments are not always in stream headwaters. As in the case of the Lamington (Black) River, sluggish upstream reaches are classified as nontrout, while trout maintenance and trout production segments are found in steep downstream gorges. Scattered trout populations are found in central and southern New Jersey (Inner and Outer Coastal Plain Provinces), but the number of trout streams in central and southern New Jersey is severely limited due to lack of suitable habitat.

Where several salmonid species co-inhabit a stream, their populations tend to be longitudinally distributed through the stream system. Brook trout typically inhabit the colder, less productive headwater areas, and overlap downstream with rainbow and brown trout. Brown trout are often found in the lower gradient downstream areas.

In addition to naturally occurring trout populations, the DFW distributes over 770,000 brook, brown and rainbow trout into over 200 waterbodies across the State, each year (Figure 2). Many of these waters are not conducive to the long-term survival of trout, however, some are able to support trout round year and have reproducing trout populations.

Life Cycle

Mature riverine trout move upstream from lakes, larger rivers and streams to spawn, seeking a bed of fine gravel in a riffle above or below a pool. Spawning gravel must be relatively free of silt and about 13 to 51 mm (1/2 to 2 inches) in diameter. Brook trout particularly favor quieter headwater streams with upwelling ground water or strong spring water flow (Greeley 1932, Kendall 1929, Ricker 1932, Webster and Eirikdottir 1976, White 1930). Brown trout pick the crest of riffles in the main channel and rainbow trout select deeper water than the other two (White and Brynildson 1967). The brook and brown trout are fall/winter spawners while the rainbow is basically a spring spawner (Table 1).

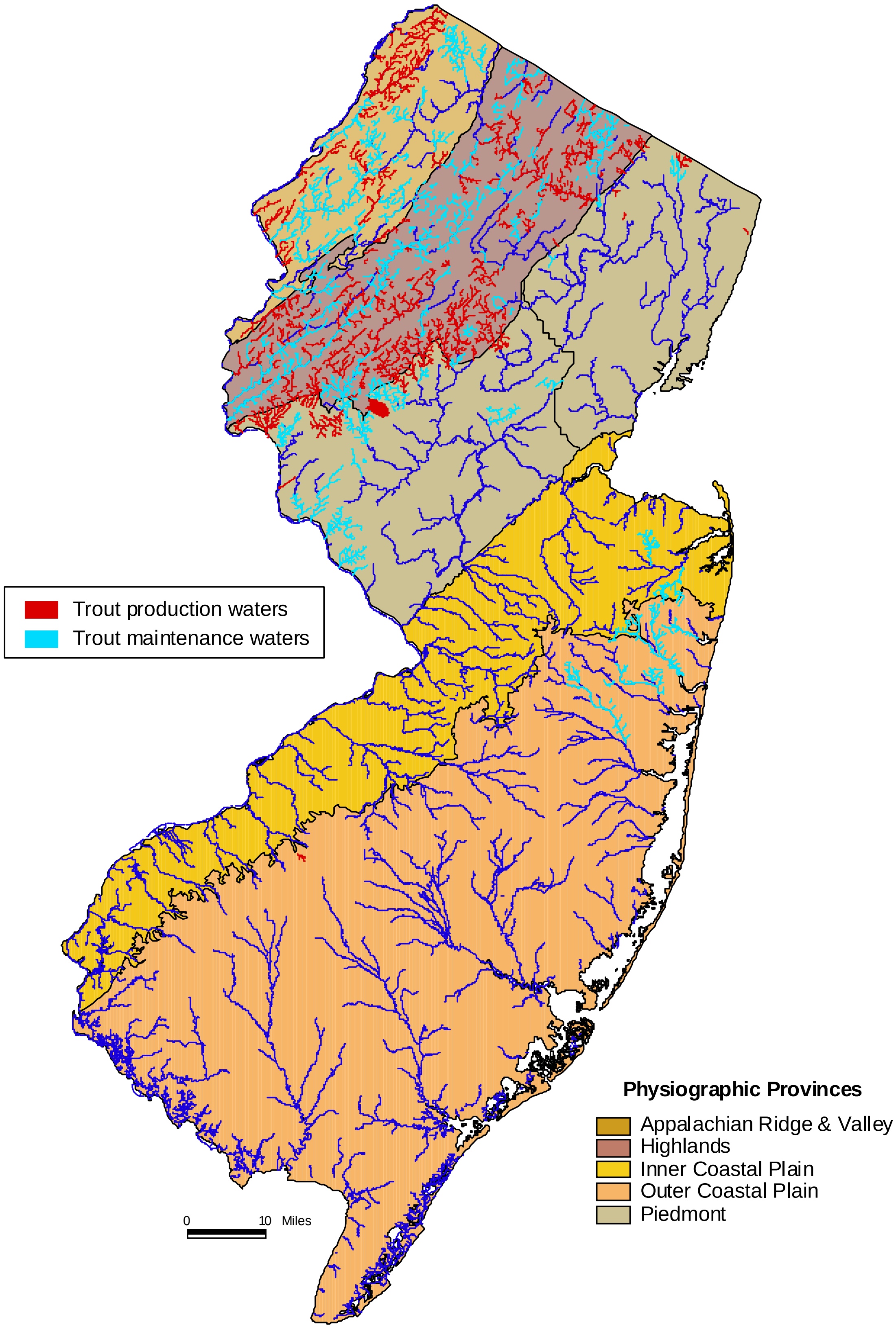


FIGURE 1.— New Jersey's trout waters (2004) shown in relation to physiographic provinces.

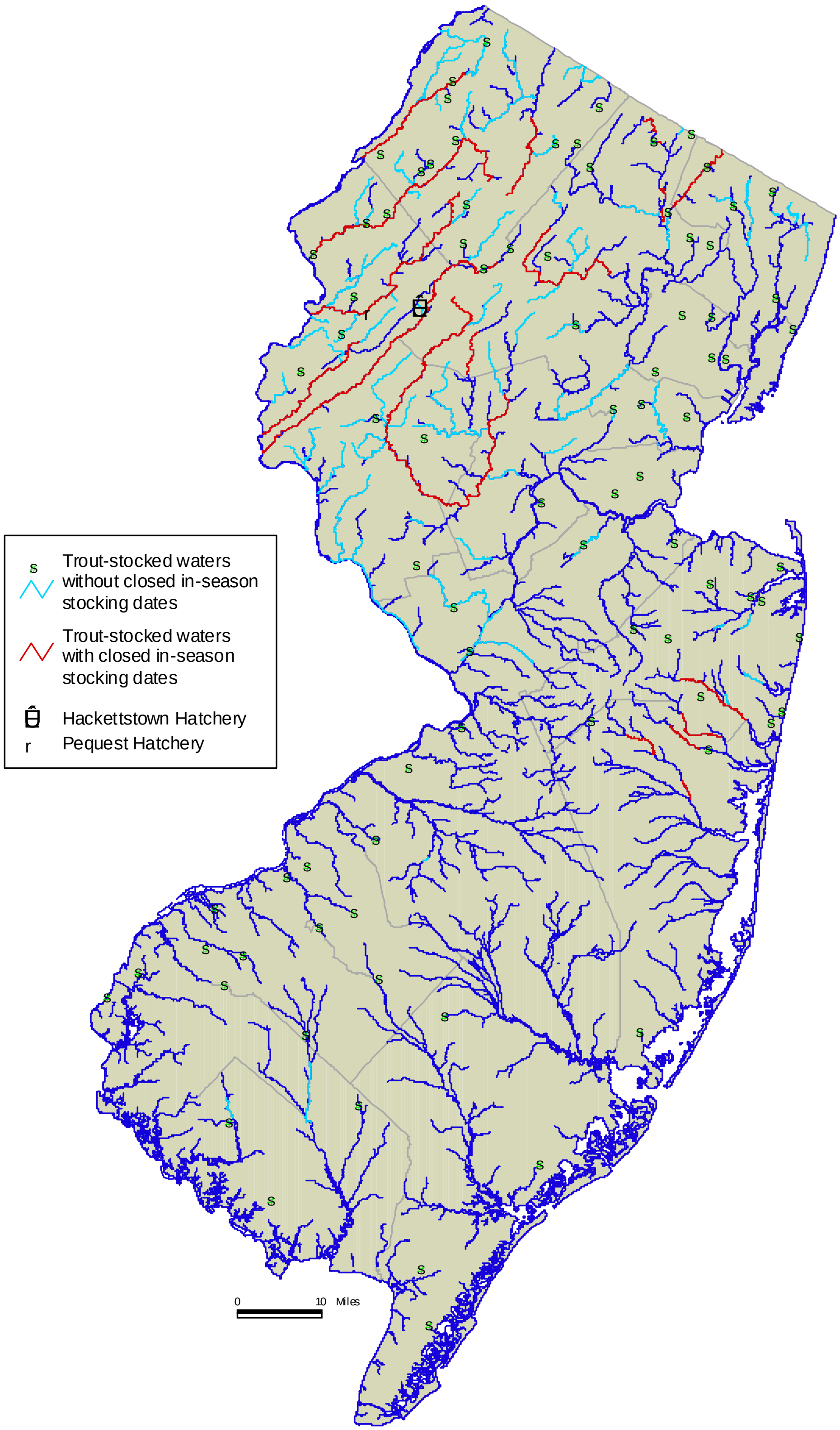


FIGURE 2.— New Jersey's trout-stocked waters (2004).

TABLE 1.— Timetable for trout spawning and egg development

Trout Species	Time of Year	Spawning Water Temperature (optimum or mean range)	Length of Egg Incubation
Brook trout	Mid-September through November	9°C	105 days at 3.9°C 90 days at 4.5°C 65 days at 7.8° C 45 days at 10.0°C 32 days at 13.4°C (Upper lethal limit is approx. 13°C)
Brown trout	October through December	6.7° - 8.9°C	95 days at 5°C 66 days at 7°C 38 days at 10.7°C (Normal development occurs up to 10°C)
Rainbow trout	February through March	10.0 - 15.5°C	75 days at 4.8°C 44 days at 7.5°C 29 days at 10.3°C 25 days at 12.0°C 21 days at 14.5°C (Normal development occurs up to 13°C)

The nest, or redd, is prepared by the female using her caudal fin (tail) to clear debris from the site and create a shallow depression. Following a courtship ritual, the male and female deposit sperm and eggs into the depression, which the female then covers with gravel. Neither parent guards the redd when spawning is completed and adults often live to spawn again in subsequent year(s). As the fertilized eggs incubate in the redd, they are sustained by the constant flow of aerated water which transports nutrients to and carries waste products away from the developing eggs as it flows through the permeable gravel. The rate of egg development is variable, depending on water temperature (Table 1). Upon hatching, the larvae (sac fry) remain buried in the gravel until the yolk sac is absorbed (3-7 days). Once the yolk is absorbed, the fry, as they are now called, emerge from the gravel and commence feeding. The events associated with the onset of spawning through fry emergence are critical, as this is the most sensitive of all life stages.

Trout are subject to predation by larger predatory fish (the fry are particularly vulnerable) and to a lesser degree by fish-eating birds and mammals. Wild trout are relatively short-lived, seldom living longer than five years in a stream. Trout may attain sexual maturity in two years with males frequently maturing a year earlier than females. If food and other factors are suitable, most mature individuals will successfully spawn each year.

Spawning activities for lake dwelling trout in New Jersey is limited to the lake trout population in Round Valley Reservoir. Stocked initially in 1977 natural reproduction was documented in 1985. Today, natural reproduction supports the entire fishery. Lake trout reach sexual maturity between 5 – 6 years of age. Spawning activity commences in the fall when mature adults begin congregating along the two dam sites in the reservoir. Males move in first, in early October, with an increasing presence of females occurring around mid to the end of the month. The exact depth of spawning is not specifically known for the Round Valley population and literature reviews indicate depth varies considerably between populations. It is noted however that gravid adults are captured 30 – 60 feet of water at the height of the spawn. Eggs are broadcast over the large boulders, which comprise the dam structures. No parental care is given. Eggs will hatch in 50 to 156 days, depending on temperature.

Food Preferences

Trout are carnivorous, feeding upon a wide variety of organisms including plankton, crustaceans, aquatic insect larvae, nymphs and adults (primarily mayfly, caddisfly, midge and blackfly), terrestrial insects, snails, worms, leeches and a wide variety of fish. Brook trout in Ontario were found to feed upon worms, leeches, crustaceans (cladocerans, amphipods, decapods), aquatic insects (over 80 genera eaten but mayfly, caddisfly, midge and blackfly larvae common), terrestrial insects (over 30 families, ants sometimes in abundance), spiders, molluscs (including clams and snails), a number of fish species including young brook trout and brook trout eggs, minnows, sticklebacks and cottids, frogs, salamanders, and a snake (Ricker 1932). The diet of brook trout consists of mostly insects and aquatic invertebrates. In general, brook trout are not particularly piscivorous (fish-eating). In streams brown trout feed mostly on bottom fauna, insects and amphipods and have been found to feed more on surface foods than brook or rainbow trout. Rainbow trout consume primarily bottom living and terrestrial insects as well as amphipods, oligochaetes (worms), crayfish and fish. The principal factors governing the types of food eaten are availability or accessibility (Neill 1938, Larkin 1956, Kalleberg 1958, Le Cren 1965, Allen 1969).

There is usually a shift in food preference as trout increase in size. Small and medium-sized trout eat large numbers of plankton, crustaceans and aquatic and terrestrial insects while larger trout will consume other fish if available. This holds true for lake trout. Large brown trout are active and feed more at night than daylight. Trout feed actively all winter, mostly on aquatic insects. Growth is highly variable, being influenced by water fertility, temperature and quantity and type of food and has been correlated to stream size.

Growth

Growth data for wild brook, brown, and rainbow trout populations in New Jersey is not available. Growth data for stocked trout following their release into open state waters is generally restricted to specific waters (impoundments).

<u>Opportunity</u> – Prepare and implement a research project to document the growth on naturally occurring brook, brown and rainbow trout populations throughout the entire state.

Habitat Requirements

Optimally, riverine habitat for brook, brown and rainbow trout is characterized as clear, cool to cold water streams with silt free rocky substrate in riffle-run areas. A 1:1 pool-riffle ratio is preferred with areas of slow, deep water. Stream banks are well vegetated and stable with abundant in-stream cover with a relatively stable annual water flow and temperature regime.

Shelter

Long recognized as one of the basic and essential elements of trout habitat, shelter serves as protection from predators and may provide areas of moderate current speed utilized as resting areas. Cover in streams may be provided by overhanging vegetation, under cut banks, submerged vegetation, submerged objects (stumps, logs, roots, rocks), floating debris and water turbulence. Shade patterns on the stream bottom are also utilized as a type of cover. Vegetation, along with undercut banks and other overhanging objects provide areas of shade preferred by brook, brown and rainbow trout (Newman 1956, Wickham 1967, Baldes and Vincent 1969, Chapman and Bjornn 1969, Lewis 1969). Brown trout are reported to utilize overhead cover to a greater extent than rainbow trout (Lewis 1969). Habitat improvements to increase shelter typically increase the carrying capacity of streams, especially for larger fish, has been well documented (Tarzwell 1937, 1938, Shetter et al. 1946, Saunders and Smith 1962).

A stream with a mixture of pools and riffles provides a diversity of environment and helps ensure protective cover and ample production of food supplies for trout. In a study of the distribution of trout in relation to stream habitat (Saunders and Smith 1962) three stream areas were characterized – riffles, flat water and pools. Riffles are small rapids where depths are usually less than five inches; flat water has a depth less than one foot with a moderate current; pools occur in areas where logs or other obstructions deflect the flow of water resulting in scouring (depth of two feet or more encountered). Fingerlings were captured in riffle sections while older trout were found in flat-water areas, where there were hiding places, and in pools. Trout were sparse in habitats where there was an accumulation of silt on the bottom.

Lake trout habitat is described as large, clear, deep, cold lakes with high levels of dissolved oxygen. Lakers are known to make use of the entire water column provided temperatures and oxygen levels are sufficient. These habitat requirements offer only limited opportunities for expanding their presence in the state.

Temperature

Since fish are cold-blooded organisms, unable to regulate their body temperature, temperature is extremely important in determining their standard metabolic rate and hence their survival. There are optimum temperatures for feeding, general activity, growth and reproduction, as well as lethal limits. Trout are a coldwater species with optimum temperature preferences, through their various life stages, below 20°C (68°F). Upper lethal temperatures for brook trout have been reported to range from 21°C to 28.3° C (26°C can be tolerated for 24 hours and 28.3°C for one hour). Optimum temperatures for this species have been reported at 14-19°C and 7-18°C. In general, rainbow trout tolerate up to 28°C, but their optimum is below 21°C. The lethal water temperature for brown trout has been reported as 25.3°C. Lake trout prefer colder temperatures, with an optimum temperature range between 8 – 15°C.

Trout will avoid warm water areas, if possible, by retreating to areas of cooler waters commonly found in the upper reaches of streams (headwater and spring-fed areas). This reaction to high temperatures limits the amount of stream or lake area available for support of a trout population. Temperatures associated with spawning and egg incubation are identified in Table 1. Eggs are particularly sensitive to adverse temperature changes during their tender stage (first half of incubation stage – after they are water hardened and before they are eyed). Sudden increases or decreases in water temperature can cause excessive mortality. Since viable trout populations are dependent on low water temperatures, warm summer months are a critical time period.

Dissolved Oxygen

Directly related to water temperature and just as critical to survival are dissolved oxygen concentrations. Colder water is capable of holding more dissolved oxygen than warmer water (Table 2). Trout require a minimum oxygen reading of 5 mg/L, with 7 mg/L preferred, to support all life stages. Trout streams are usually well aerated as water flows through riffle sections and these streams are often saturated with oxygen. The dissolved oxygen concentration in salmonid spawning beds is especially important because the concentration in the water associated with the redds (where spawning occurs) may be very different from the concentration found in the water above the redds.

TABLE 2.— Dissolved oxygen concentration at 100% saturation for water temperatures associated with trout streams.

Water Temperature °C	Dissolved Oxygen (mg/L)
5 (41°F)	12.8
10 (50°F)	11.3
15 (59°F)	10.2
20 (68°F)	9.2
25 (77°F)	8.4

Stream Bank and Riparian Vegetation

Over the years there have been extensive reviews of literature on the importance of maintaining vegetated buffer areas along streams (Karr and Schlosser 1977, Corbett and Lynch 1978). Near stream vegetation provides shade, nutrients, bank stabilization and cover for fish and therefore its presence or absence has a significant impact on fisheries resources.

A number of studies have documented the effect of streamside vegetation on water temperature in agricultural and forestry (logging) related situations (Brown and Krygier 1970, Gray and Eddington 1969, Greene 1950, Karr and Gorman 1975). These data indicate vegetation serves as an effective buffer against temperature extremes; shaded streams are cooler in the summer and warmer during winter. Increases in summer water temperatures of 5.5-9.0°C resulted when vegetation, which shades agricultural drainages, is removed. A field and laboratory study demonstrated that temperature is an extremely important factor determining the distribution of fish species (Stauffer 1976). This study, along with other observations on shifts in species composition due to temperature (Bush 1974), indicates that removal of vegetation along small streams will result in substantial changes in fish community composition. These shifts in species composition are related to temperature changes that exceed the preferred and lethal limits for species with lower temperature optimums, and favor those with higher optimum and lethal limits.

In one study streamside vegetation that was left to shade the channel, while the rest of the woods was clear-cut, resulted in only minor changes to stream temperature (Swift and Messer 1971) This study suggests that if a minimal vegetative "buffer strip" is left (along agricultural drainages), significant decreases in stream temperature could be expected. It should be noted that the focus of this study was on temperature, and other effects on water quality and in-stream habitat, relative to minimal buffer areas, were not documented. An extensive examination of temperature in various streams with different types of buffers indicated that buffer effectiveness decreases with increasing stream size (Brown and Brazier 1972). Small streams have the greatest temperature problem, but they are also the easiest to control (due to the inverse relationship between temperature change and stream discharge for a given input of thermal radiation). Finally, if temperature control is accomplished in the upper reaches of drainages, a reduction in temperature associated problems will result both downstream and upstream areas, including small lakes and reservoirs.

Near stream vegetation can also serve as an effective nutrient and sediment filter. However, there are many variables which influence filter effectiveness (type of vegetation, filter placement, width or length of filter, duration of effectiveness, soil type, etc.) which have not been thoroughly evaluated under normal agricultural conditions and quantitatively related to each other in any predictive manner.

Headwater streams represent areas where the maximum interface between aquatic and terrestrial environment occurs. In these areas, most of the energy utilized by the aquatic invertebrates and fish is terrestrial in origin (Cummins 1975, Lotrich 1973, Chapman and Demory 1963). The coarse, particulate organic matter (leaves, twigs, etc.) is broken down, by shredders, into a fine particulate organic matter which is utilized by invertebrates. At the top of this food web are the fish predators. The implication of this web is that the removal of upstream vegetation will result in reduced invertebrate production and, in turn, fish production because of loss of allochthonous (terrestrial) energy inputs. Studies have indicated low diversity and numbers of invertebrates in streams flowing through areas lacking deciduous vegetation (Minshall 1968). Therefore, it is desirable to maintain near-stream vegetation, which can be a major source of energy on which both invertebrates and vertebrates depend.

Substrate

Stream substrate is very important in the production of fish food organisms. Many aquatic invertebrates which trout feed upon spend a large proportion of their life on or in the bottom substrate. The physical nature of the bottom is considered to be of major importance in influencing the production of bottom fauna in streams (Linduska 1942, Smith and Moyle 1944, Needham 1934, Corning 1969). Under natural stream condition "rubble" is usually considered the most productive type of substrate. Sediment deposition generally results in decreased substrate types and covers suitable sites which inevitably causes changes in species diversity and numerical abundance of benthic organisms (Tebo 1955, Wilson 1957).

For trout stream substrate is also extremely important for spawning purposes. Being broadcast spawners, eggs are dispersed all along the stream substrate. For successful hatching eggs must be well oxygenated therefore the substrate must be clear of sediment. A mix of substrate sizes is also beneficial to successful hatching in that it provides nooks and crannies, which provide protection to the eggs from predators and assures good aeration.

pH

pH is a measure of the hydrogen ion concentration in water. From a pH of 0 to- 7, solutions are acid; from pH 7 to 14, solutions are alkaline. It is important to note that the toxicity of many compounds may be markedly affected by pH. In most productive fresh waters, the pH ranges between 6.5 and 8.5. Some regions, particularly the NJ Pine Barrens, have soft waters with poor buffering capacity and naturally low pH. Results of experiments conducted in New Jersey acidotrophic (pH below 5.5) coastal streams indicate brook trout are the most acid-tolerant species, followed in order by brown trout and then rainbow trout (Pyle 1957). Rainbow trout have been found to acclimate to pH from 5.8 to 9.5 (McAfee 1966) and in New Jersey streams were found not to survive at a pH of 5.9 or less (Pyle 1957). Brown trout and brook trout were found to withstand a stream pH as low as 5.0 but the brown trout did not appear to be as healthy as the brook trout (Pyle 1957).

For fingerling brook trout, a lower lethal limit in the range of 3.2 to 3.6 was found and an upper lethal limit was estimated to be 9.8 (Daye and Garside 1975). Stocked brook trout fingerlings survived for over two years in a stream where the pH ranged as low as 4.3 (Pyle 1957) and a native population inhabited a mountain stream where pH ranged as low as 4.1 after a storm event (Powers 1929). In laboratory experiments adult brook trout were able to survive five-month exposures of pH levels down to 5.0, however, egg viability was significantly less at pH 5.0 and below (Menendez 1976). The effects of pH on salmonids and other aquatic organisms are summarized in Table 3. Based on present evidence, a pH range of 6.0 to 9.0 appears to provide complete protection for the life of trout and bottom dwelling invertebrate food organisms on which they rely.

TABLE 3.— A summary of some effects of pH on salmonids and other aquatic organisms (modified from National Academy of Sciences 1973).

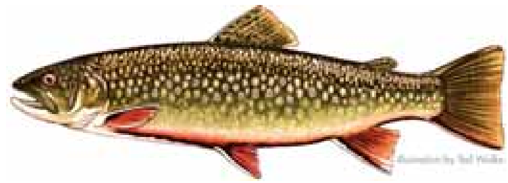
pH	Known effects
11.5-12.0	Some caddis flies (Trichoptera) survive but emergence reduced.
11.0-11.5	Rapidly lethal to all species of fish.
10.5-11.0	Rapidly lethal to salmonids. Lethal to some stoneflies (Plecoptera) and dragon flies (Odonata). Caddis fly emergence reduced.
10.0-10.5	Withstood by salmonids for short periods but eventually lethal. Some typical stoneflies and mayflies (Ephemera) survive with reduced emergence.
9.5-10.0	Lethal to salmonids over a prolonged period of time and no viable fishery for coldwater species. Causes reduced emergence of some stoneflies.
9.0-9.5	Likely to be harmful to salmonids if present for a considerable length of time and no viable fishery for coldwater species.
8.5-9.0	Approaches tolerance limit of some salmonids. No apparent effects on invertebrates.
8.0-8.5	(No effects for salmonids stated)
7.0-8.0	Full fish production. No known harmful effects on adult or immature fish, but 7.0 is near low limit for *Gammarus* reproduction and perhaps for some other crustaceans.
6.5-7.0	Not lethal to fish unless heavy metals or cyanides that are more toxic at low pH are present. Generally full fish production. Invertebrates except crustaceans relatively normal, including common occurrence of mollusks. Microorganisms, algae, and higher plants normal.
6.0-6.5	Unlikely to be toxic to fish unless free carbon dioxide is present in excess of 100 ppm. Good aquatic populations with varied species can exist with some exceptions. Reproduction of Gammarus and Daphnia prevented, perhaps other crustaceans. Aquatic plants and microorganisms relatively normal except fungi frequent.
5.5-6.0	Eastern brook trout (*Salvelinus fontinalis*) survive; rainbow trout (*Salmo gairdneri*) do not occur.
5.0-5.5	Very restricted fish populations but not lethal to any fish species unless CO^2 is high (over 25 ppm), or water contains iron salts. May be lethal to eggs and larvae of sensitive fish species. Benthic invertebrates moderately diverse, with certain black flies (Simuliidae), mayflies (Ephemerella), stoneflies, and midges (Chironomidae) present in numbers. Lethal to other invertebrates such as the mayfly. Bacterial species diversity decreased; yeasts and sulfur and iron bacteria (Thiobacillus-Ferrobacillus) common. Algae reasonably diverse and higher plants will grow.
4.5-5.0	Likely to be lethal to eggs and fry of most salmonids. Brook trout egg viability decreases significantly[1]. Brown trout (Salmo trutta) do not occur[2]. Benthic fauna restricted, mayflies reduced. Inhibits emergence of certain caddis fly, stonefly, and midge larvae. Diatoms are dominant algae.
4.0-4.5	Native brook trout populations have been documented in streams where the pH has ranged as low as 4.1[3]. Fish populations limited. Some caddis flies and dragon flies found in such habitats; certain midges dominant. Flora restricted.
3.5-4.0	Lethal to salmonids. All flora and fauna severely restricted in number of species. Cattail (*Typha*) is only common higher plant.
3.0-3.5	Unlikely that any fish can survive for more than a few hours. A few kinds of invertebrates such as certain midges and alderflies, and a few species of algae may be found at this pH.

[1] From study conducted by Menendez (1976).
[2] From study conducted by Pyle (1957)
[3] This information contradicts NAS (1973), but is supported by a study conducted by Powers (1929).

Brook Trout *(Salvelinus fontinalis)*

General Information

The only salmonid species native to New Jersey, and designated the state fish. Reproducing brook trout populations are found in streams, primarily in the northern region of the state. Brook trout are tolerant of low pH conditions. Hatchery reared "brookies" are stocked by the NJDFW throughout the state.



Native Range	Eastern Canada northward to the Arctic Circle, the new England States, and southward through Pennsylvania, along the crest of the Appalachian Mountains to northeastern Georgia. Western limits include Manitoba south through the Great Lake States (Raleigh, 1982).

Habitat Description

River: Clear, cold spring-fed water, silt free rocky substrate, 1:1 pool-riffle ratio. Tend to occupy headwater stream areas, especially when brown and rainbow trout are also present. Can tolerate lower pH than other salmonids (4.0 – 9.5). Prefer moderate flows compared to brown and rainbow trout. Base flows $\geq$ 55% of average annual daily flow is excellent, while base flows 25 – 50% is considered fair.

Lake: Clear, cold lakes that are typically oligotrophic. Presence in lakes is very temperature dependent.

Optimum Habitat Requirements	
Dissolved Oxygen	$\geq$ 5 mg/l
Temperature	4.5 – 10°C
pH	6.5 – 8.0
Turbidity	0 – 30 JTU's
Current	7 – 11 cm/sec

Diet	
Fry	Terrestrial and aquatic insects
Juveniles	Terrestrial and aquatic insects
Adults	Fish, terrestrial and aquatic insects
Notes: opportunistic sight feeders, alter diet according to food availability	

Reproduction

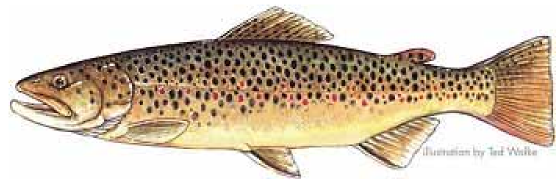
Time of Year	Mid September into November	Age Males Mature	0
Temperature Range	4.5 – 10°C	Age Females Mature	1
Water Depth		Nest	Built by female
Substrate	Gravel	Egg Type	Demersal
Time of Day	Mid-day	Parental Care	None
Critical pH		Days to Hatching	32 – 105 (temperature dependent)
Velocity Range	1 – 92 cm/sec	Oxygen Level	> 50% saturation

Notes: Spawn repeatedly throughout the fall season. Spawning success is greatly reduced in the presence of fine sediment, which reduces inter-gravel oxygen concentration. Females dig redds in gravel and fertilized eggs are then covered with substrate. Life history information taken from Raleigh, 1982.

Brown Trout *(Salmo trutta)*

General Information

Although not native to New Jersey, reproducing brown trout have become established in northern New Jersey streams through wide spread stocking. It is more tolerant to warmer temperatures than brook and rainbow trout. An anadromous (sea-run) fishery is currently being established in the Manasquan River using hatchery-reared fish.



Native Range	Throughout Europe and western Asia from Iceland, the British Isles and Scandinavia to the Aral Sea and Afghanistan. Also found in the Atlas Mountains of Northern Africa. Introduced in the United States in 1883 and is now found in many states. (Smith, 1985)

Habitat Description
River: Clear, cool to cold water, relatively silt free bottom rocky substrate. 50 to 70% pool to 30 to 50% riffle-run habitat combination with areas of slow, deep water; abundance of in-stream cover is important (Raleigh, 1984).
Lake: Clear, cool to cold, deep lakes, typically oligotrophic. Require tributary streams to spawn. Brown trout grow larger in lake environments than in streams.

Optimum Habitat Requirements	
Dissolved Oxygen	≥ 7 mg/ l
Temperature	12 – 19°C
pH	6.8 – 7.8
Turbidity	< 50 ppm
Current	02. – 5.5 ft/s (feeding) 0 to 0.7 ft/s (resting)

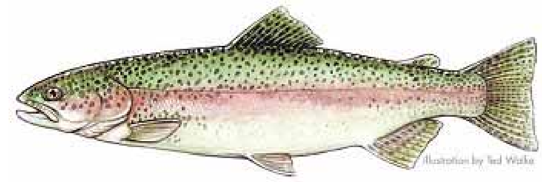
Diet	
Fry	Small bottom organisms, zooplankton
Juveniles	Terrestrial & aquatic insects, amphipods
Adults	Fish, crustaceans, insects
Notes: Size selective feeders – Insects are primarily Ephemeroptera, Trichoptera & Plecoptera. Active night feeders.	

Reproduction			
Time of Year	October – December	Age Males Mature	0 +
Temperature Range	7 – 9°C	Age Females Mature	1 +
Water Depth	24.4 – 45.7 cm	Nest	Bury in gravel
Substrate	Gravel (0.6 – 0.7 cm)	Egg Type	Demersal
Time of Day		Parental Care	None
Critical pH	5.0	Days to Hatching	38 – 95 (temp dependent)
Velocity Range		Oxygen Level	
Notes: Cover is essential to brown trout fry survival (Raleigh, 1984).			

Rainbow Trout *(Oncorhynchus mykiss)*

General Information

Like the brown trout, rainbow trout are a non-native salmonid species and are distributed annually throughout the state through the FW's trout stocking program. These stockings, however, have not resulted in wide spread reproducing populations as seen with brown trout. The number of reproducing populations within the state is minimal.



Native Range	Pacific drainages from Northwestern Mexico to the Kushowin River in Alaska. In Canada, found in the Peace and Athabasca Rivers in the Mackenzie drainage (Smith 1985).

Habitat Description
River: Clear, cold stream systems with a 1:1 pool – riffle ration with areas of slow deep water; abundant in-stream cover and stable water flow, Base flow $\geq$ 50% of average annual daily flow is considered excellent, 25 – 50% of annual daily flow is only considered fair. (Raleigh, 1984).
Lake: Clear, cold, deep lakes, typically oligotrophic. Require tributary streams with a gravel substrate to reproduce (Raleigh, 1984).

Optimum Habitat Requirements	
Dissolved Oxygen	$\geq$ 7 mg/l
Temperature	12 – 19°C
pH	6.5 – 8.0
Turbidity	0 – 30 JTU's
Current	

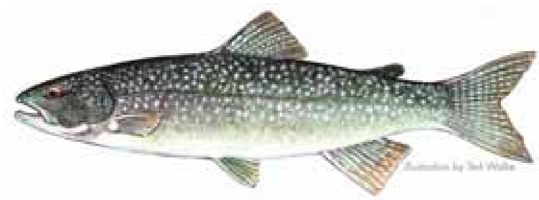
Diet	
Fry	Insects
Juveniles	Aquatic and terrestrial insects
Adults	Fish, aquatic and terrestrial insects
Notes: Opportunistic feeders	

Reproduction			
Time of Year	February – March	Age Males Mature	2 - 3
Temperature Range	10 – 15.5°C	Age Females Mature	3
Water Depth		Nest	Built by female
Substrate	Gravel, size dependent on size of individual	Egg Type	Demersal
Time of Day	Day / Night	Parental Care	None
Critical pH		Days to Hatching	28 – 40 (temp. dependent)
Velocity Range		Oxygen Level	
Notes: Almost exclusively stream spawners; streams with no inlet or outlet generally do not have a reproducing population of rainbow trout.			

Lake Trout *(Salvelinus namaycush)*

General Information

This non-native salmonid is found primarily in two NJ reservoirs (Round Valley and Merrill Creek). The lake trout is the state's largest salmonid species with the current state record weighing in at 32 lbs., 8 oz. Round Valley Reservoir supports a reproducing lake trout population and may represent the most southern range of this species in the U.S.



Native Range	Widely distributed only in the northern reaches of North America but has been introduced elsewhere. In the United States, occurs in the New England States, the Great Lake states of New York, Pennsylvania, Michigan, Wisconsin and Minnesota. In the west, Montana, Idaho and Alaska. In Canada, native lake trout occur in all provinces and territories, except Prince Edward Island, insular Newfoundland, portions of the prairie provinces, and coastal British Columbia.

Habitat Description

River: Occurs in some river systems in the northern half of its range, low tolerance of salinity (11- 13% upper limit).

Lake: Large, deep, clear, cold lakes with high levels of dissolved oxygen throughout. Lake trout will make use of entire water column provided temperature and oxygen levels are sufficient. Highly mobile throughout the water column.

Optimum Habitat Requirements	
Dissolved Oxygen	$\geq$ 6 mg/ l
Temperature	8 – 15°C
pH	
Turbidity	
Current	

Diet	
Fry	Zooplankton
Juveniles	Zooplankton, insects
Adults	Fish, zooplankton, insects
Notes: Feed on the most abundant food available	

Reproduction			
Time of Year	September – December	Age Males Mature	5
Temperature Range	12-13°C	Age Females Mature	6 - 8
Water Depth	15 cm – 55 m	Nest	None
Substrate	Rubble/ Large rock	Egg Type	Broadcast
Time of Day	Dusk-midnight	Parental Care	None
Critical pH		Days to Hatching	50 – 156 (temp. dependent)
Velocity Range		Oxygen Level	

Notes: May spawn intermittently after reaching sexual maturity. Spawn in lakes, rarely in stream environments.

Landlocked (Atlantic) Salmon *(Salmo salar)*

General Information

The hard fighting Atlantic salmon may soon be making a re-appearance in NJ, having been stocked in the 1950's in a then privately owned lake. It is anticipated that in May 2006, several thousand 8-inch salmon, from Massachusetts, will be stocked into one of New Jersey's regulated Holdover Trout Lakes. These newly stocked fish are expected to reach the legal minimum size of 12 inches the following year.

Native Range	Naturally found in the basin of the North Atlantic Ocean compromising the entire water region of Greenland, Portugal, Iceland, Southern Greenland, the Ungava region of North Quebec and south to Connecticut River. Landlocked forms were introduced to the New England States and parts of Canada with success. (Scott and Crossman 1973)

Habitat Description

River: Utilizes rivers only for spawning and nursery purpose, juveniles migrate out to open water after spending considerable time in the river. Preferable habitat for successful spawning is rapid moving water with a good gravel substrate, although may occur under a variety of water flow conditions with different substrate. Salmon will not spawn in still water with a muddy substrate. (Leim and Scott,1966)

Lake: Prefers Oligotrophic lakes that are deep, low in organic matter, chemically infertile with good dissolved oxygen levels with a maximum temperature of 23°C, however can tolerate marginal and homothermous Lakes that have less stringent water quality condition. Requires tributaries flowing into the lake in order to have successful reproduction. (Havey and Warner 1970)

Optimum Habitat Requirements	
Dissolved Oxygen	≥ 5 mg/ l
Temperature	≤ 23°C
pH	≥ 6.0
Turbidity	
Current	

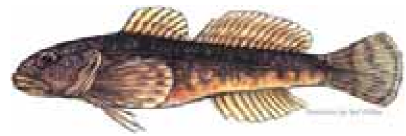
Diet	
Fry	Plankton
Juveniles	Aquatic and Terrestrial Insects
Adults	Smelt and Alewife
Note: Diet for adult landlocked salmon only.	

Reproduction			
Time of Year	October – November	Age Males Mature	1 - 2
Temperature Range	0-3°C	Age Females Mature	1 - 2
Water Depth	12.7 – 25.4 cm	Nest	Bury in gravel
Substrate	Gravel/Sand	Egg Type	Benthic
Time of Day		Parental Care	None
Critical pH	≥ 6.0	Days to Hatching	99 – 161 (temp. dependent)
Velocity Range		Oxygen Level	≥ 5 mg/ l
Notes: Salmon spawn only in rivers after spending 1 to 2 years in open water.			

Slimy Sculpin *(Cottus cognatus)*

General Information

Sculpins prefer high gradient waters with rock, gravel substrate, which limits their distribution to the northern waters of the state. They are intolerant of impaired water qualities.



Native Range	Northern North America to extreme northeastern Siberia. In North America, it occurs from Virginia, Labrador and Ungava on the east, westward through most of northern North America to Alaska, and on St. Lawrence Island in the Bering Sea. (Scott and Crossman 1973).

Habitat Description
River: Cool, rock/gravel; headwater streams.
Lake: Occurs in lakes outside the state but in New Jersey it is essentially limited to stream environments.

Optimum Habitat Requirements	
Dissolved Oxygen	
Temperature	4 – 16°C
pH	
Turbidity	
Current	

Diet	
Fry	Insects
Juveniles	Insects
Adults	Insects
Notes: Activity mostly nocturnal	

Reproduction			
Time of Year	May	Age Males Mature	
Temperature Range	5 – 8°C	Age Females Mature	
Water Depth	< 1.5 m	Nest	Under a ledge, rock or root
Substrate	Rocks, submerged tree roots	Egg Type	Adhesive
Time of Day		Parental Care	Male
Critical pH		Days to Hatching	28
Velocity Range		Oxygen Level	
Notes: Eggs deposited on the ceiling of the nest, nests usually contain eggs from more than 1 female.			

Longnose Dace *(Rhinichthys cataractae)*

General Information

A species associated with trout due to its similar affinity for swift moving, steep gradient headwater streams. A bottom dwelling species, relatively short lived, with few individuals five years or older. Longnose dace are found in the northern and central regions of New Jersey.

Native Range	Occurs from coast to coast across North America, as far south as the Rocky Mountains in Mexico and as far north as the Mackenzie River system near the Arctic Circle. In the east, it extends south through the Appalachians to Georgia, in the west, along the Rocky Mountains, and along the Pacific Coast from Oregon north through British Columbia. (Edwards, 1983).

Habitat Description

River: Steep gradient, swift flowing, and typically headwater streams with a rock and gravel substrate. Benthic species residing just above the substrate. Shallow water species typically reside in water 0.3 meters deep or less. Over hanging cover orientated species. In swift flowing streams species requires areas of cover to protect from current.

Lake: Literature citations identify wave-swept areas of lakeshores, in New Jersey their presence is essentially limited to streams.

Optimum Habitat Requirements	
Dissolved Oxygen	
Temperature	14 – 18°C
pH	
Turbidity	
Current	> 45 cm/sec

Diet	
Fry	Algae
Juveniles	Mayflies, chironomids; aquatic insects
Adults	Aquatic/terrestrial insects and larvae
Notes: Will eat whatever is in abundance.	

Reproduction

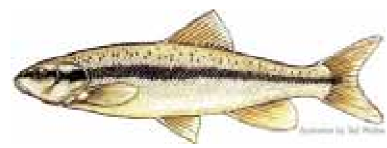
Time of Year	June – July	Age Males Mature	2
Temperature Range	14 – 19°C	Age Females Mature	2
Water Depth		Nest	None
Substrate	Gravel/rock	Egg Type	Demersal, adhesive
Time of Day		Parental Care	
Critical pH		Days to Hatching	
Velocity Range	45 – 60 cm/sec	Oxygen Level	

Notes: Life history information taken from Edwards 1983.

Blacknose Dace *(Rhinichthys atratulus)*

General Information

Blacknose dace are commonly found in New Jersey trout waters. They appear to be somewhat adaptable to low-gradient waters since they have also been documented in a few locations within the Lower Delaware Drainage. Like its cousin, the longnose, blacknose dace are relatively short lived, reaching age 3 or 4 years of age at most.



Native Range	Atlantic Coast west through the Great Lakes region to North and South Dakota. Southward it is found on both sides of the Appalachian Mountains to Georgia, Alabama, and Mississippi. In Canada it inhabits clear, cold streams from Nova Scotia to Manitoba.

Habitat Description

River: Small, clear swift flowing streams with gravel, rock substrate. Although known to prefer high gradient waters blacknose dace within the state have also been documented in low gradient waters of Southern New Jersey.

Lake: A stream dwelling species but may be found in some lakes near the mouths of tributaries.

Optimum Habitat Requirements	
Dissolved Oxygen	
Temperature	
pH	
Turbidity	
Current	

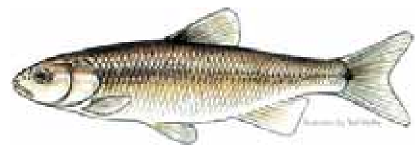
Diet	
Fry	Aquatic insect larvae
Juveniles	Aquatic insect larvae
Adults	Aquatic insect larvae
Notes: Prey on their own eggs.	

Reproduction			
Time of Year	May – June	Age Males Mature	2
Temperature Range	15.5 – 18°C	Age Females Mature	2
Water Depth	Shallow	Nest	None
Substrate	Gravel	Egg Type	
Time of Day		Parental Care	Male
Critical pH		Days to Hatching	
Velocity Range		Oxygen Level	
Notes: Spawn in shallow riffle areas. Prey on their own eggs during spawning. Life history information taken from Scott and Crossman 1973.			

Creek Chub *(Semotilus atromaculatus)*

General Information

Creek chubs are found in streams throughout the state. Individuals reaching 10 inches in length are not uncommon. Although sometimes found in lakes they prefer clear, small streams abundant in cover.



Native Range	Widely distributed from the Rocky Mountains to the Atlantic Coast and from the Gulf of Mexico to southern Manitoba and Quebec. (McMahon, 1982).

Habitat Description

Rivers: Small, clear, cool streams with moderate to high gradients. Prefer shallow streams (<1m depth) with a gravel substrate for spawning but are found across a variety of substrates. Found in the pool and run areas of streams with abundant cover and forage.

Lakes: May occasionally be encountered in ponds and lakes but essentially is a stream dwelling species.

Optimum Habitat Requirements	
Dissolved Oxygen	
Temperature	12 – 21°C
pH	6.0 – 9.0
Turbidity	
Current	< 60 cm /sec

Diet	
Fry	Terrestrial and aquatic insects
Juveniles	Terrestrial and aquatic insects, mollusks, and fish
Adults	Terrestrial and aquatic insects, mollusks, and fish
Notes:	

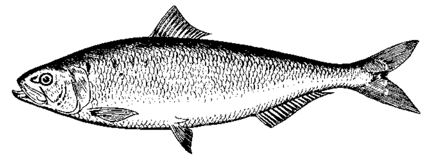
Reproduction			
Time of Year	April – July	Age Males Mature	2 - 5
Temperature Range	14°C	Age Females Mature	2 - 5
Water Depth	Shallow	Nest	Male
Substrate	Gravel	Egg Type	
Time of Day		Parental Care	
Critical pH		Days to Hatching	10
Velocity Range		Oxygen Level	

Notes: Successful reproduction is adversely affected by water temperatures < 11°C. Life history information taken from McMahon 1982.

Alewife (*Alosa pseudoharengus*)

General Information

A schooling fish, primarily anadromous, inhabiting the ocean and many coastal/tidal river systems in NJ. Freshwater land-locked populations have been established in many lakes throughout the state and are often an important prey species for a variety of game fish. They are also commercially harvested and used as baitfish.



Native Range	Land-locked forms are located mostly in the NE United States. Their range extends from Nova Scotia to North Carolina and into the Great Lakes. (Bochenek 1981, Pardue 1983)

Habitat Description

Rivers: River populations are anadromous. Found in river systems during the spring spawning migration (April-June). Will utilize smaller streams for spawning than the closely related American shad.

Lakes: May occupy all strata of a land-locked waterbody during the course of the year. Primarily pelagic (open water), however, will move into littoral areas in late spring and summer to spawn and then return to deeper water. Have a preference for the warmer waters. Also move into shallow areas at night and return to deeper waters during the day. Move in large schools. Attracted to light.

Optimum Habitat Requirements	
Dissolved Oxygen	
Temperature	11-19°C (adults) 17-19°C (young)
pH	
Turbidity	
Current	

Diet	
Fry	zooplankton
Juveniles	insect larvae, zooplankton, some fish larvae
Adults	insect larvae, zooplankton,
Notes: Planktivores become more omnivorous with increase in size. Mainly filter feeders.	

Growth

Age	1	2	3
Male (total length in mm)	95	127	135
Female (total length in mm)	102	128	142

Notes: Growth data from Lake Hopatcong, 1979-1980 (Bochenek 1981). Landlocked alewives have a shorter life expectancy and poorer growth rate than its anadromous counterparts. Females grow faster. Growth slows significantly after the onset of sexual maturity.

Reproduction

Time of Year	June	Age Males Mature	2 - 3
Temperature Range	10° - 26.7°C	Age Females Mature	2 - 3
Water Depth	150 - 300 mm	Nest	None
Substrate	Veg, sand, gravel	Egg Type	Non-adhesive
Time of Day	Night	Parental Care	None
Critical pH		Days to Hatching	4 - 6
Velocity Range	Not critical	Oxygen Level	critical

Notes: Females move into spawning areas (tributaries and shallow littoral zones) first. Will spawn in moderate currents if a more adequate spawning area is unavailable. Spawn in groups of two or three - each female deposits 60,000-100,000 eggs. Diet, growth and reproduction information taken from Brown 1972;Janssen 1976; Crowder 1983; Janssen 1978; Nigro 1982 and Bochenek 1981.

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Classification of NJ Trout Waters

Overview

The high water quality and habitat standards necessary for the survival and successful reproduction of trout have made them a useful indicator of stream health. In 1968, the process of identifying and classifying New Jersey waters according to their suitability to support trout was initiated under Federal Aid Grant F-48-R. Over the course of the next five years a classification system for New Jersey waters was developed based upon sampling completed under this study. This system classified the state's waters as trout production (natural reproduction occurring), trout maintenance (ability to support trout year round, but no reproduction documented, and non-trout (habitat and/or water quality are not conducive to the presence of trout or trout associated species). The Bureau's classification system, although already in use by various programs within the Department, was formally recognized in 1981 under the State's newly adopted *Surface Water Quality Standards*.

As the name implies, the *Surface Water Quality Standards* includes statements of policy, designated use classifications and corresponding water quality criteria, and surface water classifications. The Clean Water Act of 1972 protects waters based upon their pre-existing use, so although waters may suffer severe impacts from surrounding land uses ultimately effecting the biotic community its classification is never downgraded. The suitability of a waterway to support trout affects the stringency of the standards set. Trout production waters are awarded Category I status, one of the Department's highest levels of protection which mandates an anti-degradation standard for a number of identified water quality parameters. The Department's Land Use Regulation Program, through Stream Encroachment, Freshwater Wetlands, and the more recently developed storm water rules acknowledge the fragile nature of these ecosystems and provide additional protective measures.

Although a vast amount of work has been accomplished in classifying New Jersey waters, waters continue to be classified and reclassified according to their trout supporting capabilities, when justified by additional field investigation data collected by the Bureau. The official surface water classification of waters is changed by the NJDEP's Bureau of Water Quality Standards and Assessment through an established rule making process.

Background

Visual assessments of trout streams in New Jersey were recorded in the late 1800's, and a more extensive inventory of trout resources was conducted from 1918 to 1920. The first water quality standards adopted by a New Jersey State agency (Department of Health), in 1964, recognized the importance of trout as an indicator of high water quality by including a special provision for trout waters. The process of identifying and classifying New Jersey's trout waters, however, began in earnest in 1968 with the initiation of Job III-1 under D.J. Project No. F-20-R, Research in Trout Management. The development of electrofishing as a technique for capturing fish, in the 1950's and 1960's, greatly facilitated this effort.

Over a five year span, data was collected under Job III-1, "Ecological Survey of NJ 'Trout' Streams and Tributaries." Under Job III-2, "Classification of New Jersey Trout Streams," the data collected from 95 sampling sites were used to develop a methodology for characterizing a stream's ability to support trout. The methodology classifies the state's waters based on the occurrence of naturally reproducing trout and the presence or absence of trout and trout associated species. A list of waters and their trout waters classifications was prepared (Soldwedel, 1979) and the report was disseminated and filed with the DEP's. Division of Water Resources, Bureau of Water Pollution Control. In 1981 DEP, although already providing protection to trout streams through its regulatory programs, further recognized the importance of maintaining and preserving trout waters by incorporating the classification system developed by NJDFW into the state's *Surface Water Quality Standards* (N.J.A.C. 7:9B et seq.).

Surface Water Quality Standards

New Jersey's *Surface Water Quality Standards* is perhaps the strongest line of defense in protecting open state waters. The document establishes surface water criteria for approximately 120 substances and water quality parameters such as pH, temperature, dissolved oxygen, and dissolved solids according to stream classification. Criteria for certain substances (temperature, dissolved oxygen, and suspended solids) are more stringent for trout waters than for nontrout waters. The document also defines and provides the classification of waters throughout the state.

The general classification applied to freshwaters of the state is FW. Waters located wholly within state or federal land or special holdings are typically classified as FW1. These waters receive the highest protection possible and shall be maintained as to quality in their natural state. All other surface freshwaters (excluding the Delaware River and Pinelands waters) are classified FW2. Waters are then further classified according to their suitability to support trout.

TP - Trout production	Waters designated [at N.J.A.C. 7:9B-1.15(b) through (g)] for use by trout for spawning or nursery purposes during their first summer.
TM - Trout maintenance	Waters designated [at N.J.A.C. 7:9B-1.15(b) through (g)] for the support of trout throughout the year.
NT - Nontrout	Freshwaters that have not been designated [in N.J.A.C. 7:9B-1.15(b) through (h)] as trout production or trout maintenance. These waters are generally not suitable for trout because of their physical, chemical, or biological characteristics, but are suitable for a wide variety of other fish species.

Fresh waters classified as FW2 may be further designated as "Category One Waters" (C1) for the purposes of implementing anti-degradation policies (N.J.A.C. 7:9B-1.5(d)). These policies protect C1 waters from measurable changes to the existing water quality. These waters can be identified because of their clarity, color, scenic setting, other characteristics of aesthetic value, exceptional ecological significance, exceptional water supply significance, or exceptional fisheries resource(s). These waters may include but are not limited to:

1) Waters originating wholly within Federal, interstate, State, county or municipal parks, forests, fish and wildlife lands, and other special holdings that have not been designated as FW1.
2) Waters classified as FW2 trout production and their tributaries;
3) Surface waters classified as FW2 trout maintenance or FW2 non trout that are upstream of waters classified as FW2 trout production;
4) Shellfish waters of exceptional resource value;
5) Other waters and their tributaries that flow through, or border, Federal, State, county, or municipal parks, forests, fish and wildlife lands and other special holdings.

“Category Two waters” (C2) means those waters not designated as outstanding national resource waters or Category One. The surface water classification for individual waters can be found in N.J.A.C. 7:9B-1.15.

Although many New Jersey waters have been identified and classified, changes to individual surface water classifications continue to be made. NJDEP may initiate reclassification proceedings or entertain petitions for reclassifying specific segments under N.J.A.C. 7:9B-1.11. The NJDFW’s Bureau of Freshwater Fisheries is responsible for collecting data for classification purposes and verification of third party data. This work is performed under Grant No. F-48-R, Project II “Investigations and Management of Coldwater Fisheries,” Job 2 “Classification of New Jersey Trout Waters.” When supported by field investigation data, the NJDFW formally requests classification changes to individual waters by providing supporting technical documentation to the DEP office responsible for promulgating changes to the SWQS (currently the Office of Environmental Planning Standards, Assessment and Modeling). These recommendations are then incorporated into an established rule making process with a required public comment period.

A three-part report prepared by NJDFW lists by sub-watersheds the trout production, trout maintenance and nontrout waters that have been surveyed and classified by the Bureau according to their trout supporting capabilities; the reproducing trout species in each trout production water; and waters which have been proposed for reclassification but have not been adopted in the Surface Water Quality Standards through a rule making process (Appendix C). This report is periodically updated when new classifications are adopted or when warranted by additional survey data.

Recognition of Trout Waters in NJDEP Regulatory Programs

A variety of regulatory programs administered by NJDEP give special consideration to designated trout waters. The Land Use Regulation program through its stream encroachment and freshwater wetlands permits recognize the surface water classifications for trout production and trout maintenance waters, as well as trout-stocked waters. Additional protection is afforded by minimizing project impacts through design modifications, timing restrictions and increased buffer requirements. The Environmental Review Program staff within the Division of Fish and Wildlife review stream encroachment and freshwater wetland applications to minimize environmental impacts to for all water sof the state.

New Jersey's Pollutant Discharge Elimination System (NJPDES) Program protects New Jersey's ground and surface water quality by assuring the proper treatment and discharge of wastewater (and its residuals) and stormwater from various types of facilities and activities. To accomplish this, permits are issued limiting the mass and/or concentration of pollutants which may be discharged into ground water, streams, rivers, and the ocean. The classification of a waterway affects the concentration and types of pollutants allowed to be discharged. Specifics to the protection of trout waters through these and other Department programs is further elaborated within the Management of Habitat section of this plan.

Classification Methodology

Lakes

Lakes are classified as trout maintenance or nontrout according to their ability to support trout year round. Trout survival in lakes is dependent upon summer water quality conditions, which can reach critical levels during the summer months. Lakes are surveyed mid-August when maximum annual temperature levels are reached and dissolved oxygen levels are typically at the lowest levels. To support trout lakes must have, throughout the year, a layer of water with favorable conditions of temperature (21° C or less) and dissolved oxygen (4 mg/l or greater). Surveyed lakes that meet this criteria are classified as trout maintenance.

Streams

Streams are classified based on the documented occurrence of natural reproduction, and the presence or absence of trout and/or trout associated species. Streams which lack naturally reproduced trout in their first year of life are classified as trout maintenance or non-trout based upon the stream's total fish population.

> **Trout Production** – Young-of-the-year trout must be documented within the sampled stream segment. Young-of-the-year (y-o-y) trout can be visually distinguished from older trout in the field, based upon their size (typically less than 100 mm in length.
>
> **Trout Maintenance** – *Incidence of Occurrence* of trout and/or trout associated species > 20 %.
>
> **Non–Trout** - *Incidence of Occurrence* of trout and/or trout associated species < 20%.

The *Incidence of Occurrence* (I.O.) was initially developed based upon fisheries data collected during the trout classification study in 1968 – 1971. It was later modified in 1973 as sampling efforts continued and additional data became available. The number of incidences that the species was found to inhabit a stream with a naturally reproducing trout population was proportionally compared to the total number of stream segments in which the species was found to occur. The result was an *Incidence of Occurrence*, expressed as a percentage, for that particular species with reproducing trout populations (Table 4). The higher the *Incidence of Occurrence* the greater the species' "association" with trout.

TABLE 4.— Incidence of Occurrence (I. O.) of selected species in association with naturally reproduced trout (revised 1973).

	Naturally reproducing trout		**Incidence of Occurrence**
Fish Species	**Present**	**Absent**	**(%)**
slimy sculpin - *Cottus cognatus*	10	1	90.9
longnose dace - *Rhinichthys cataractae*	29	48	37.7
blacknose dace - *Rhinichthys atratulus*	69	146	32.1
creek chub - *Semotilus atromaculatus*	35	79	30.7
white sucker - *Catostomus commersoni*	51	217	19.0
fallfish - *Semotilus corporalis*	9	42	17.6
pumpkinseed - *Lepomis gibbosus*	35	185	15.9
rock bass - *Ambloplites rupestris*	5	28	15.6
American eel - *Anguilla rostrata*	30	183	14.1
tessellated darter - *Etheostoma olmstedi*	18	116	13.4
goldfish - *Carassius auratus*	2	16	11.1
smallmouth bass - *Micropterus dolomieu*	4	37	9.7
common shiner - *Luxilis cornutus*	10	100	9.1
largemouth bass - *Micropterus salmoides*	9	93	8.8
redfin pickerel - *Esox americanus*	7	85	7.6
brown bullhead - *Ameiurus nebulosus*	7	94	6.9
bluegill - *Lepomis macrochirus*	6	86	6.5
redbreasted sunfish - *Lepomis auritus*	9	134	6.3
satinfin shiner - *Cyprinella analostana*	1	18	5.3
eastern mudminnow - *Umbra pygmaea*	2	39	4.9
cutlips minnow - *Exoglossum maxillingua*	1	26	3.7
chain pickerel - *Esox niger*	2	56	3.4
golden shiner - *Notemigonus crysoleucas*	2	101	1.9
creek chubsucker - *Erimyzon oblongus*	1	91	1.1
banded killifish – Fundulus diaphanus	0	22	0.0
stonecat – *Noturus flavus*	0	20	0.0
common carp - *Cyprinus carpio*	0	20	0.0
yellow perch - *Perca flavescens*	0	20	0.0

An I.O. of 20% has been established as the minimum value that would classify a species as being "trout-associated." To determine the I.O., the I.O. values for each species found in the survey are summed and then divided by the total number of species present to obtain an average I.O. An value of 20% or greater yields a trout maintenance classification and a value less than 20%yields non-trout.

For example, consider the following three hypothetical cases:

Stream A	
Species	**Incidence of Occurrence (%)**
brown trout	100.0
white sucker	19.0
blacknose dace	32.1
creek chub	30.7
Total	**181.8**

The average I.O. for this stream is 45.4%. Because this value exceeds 20.0% this stream would be classified as trout maintenance.

Stream B	
Species	**Incidence of Occurrence (%)**
brown trout	100.0
pumpkinseed	15.9
redfin pickerel	7.6
mudminnow	4.9
carp	0.0
killifish	0.0
stonecat	0.0
Total	**128.4**

The average I.O. for this stream is 18.3%. Because this value is less than 20.0% this stream would be classified as nontrout, despite the presence of brown trout.

Stream C	
Species	**Incidence of Occurrence (%)**
blacknose dace	32.1
creek chub	30.7
pumpkinseed	15.9
tessellated darter	13.4
Total	**92.1**

If trout are not found, a stream may still qualify for a trout maintenance classification if a significant number of trout associated species are found. The average I.O. for this stream is 23.0%. Because this value exceeds 20.0% this stream would be classified as trout maintenance (despite the absence of trout) because of the presence of sufficient numbers of trout associated species.

The data collected at a particular sampling site is then projected to cover larger sections of stream on the basis of similar chemical and physical conditions. For ease in identifying particular stretches, the boundaries of classified stream segments, to the extent possible, are described using physically identifiable structures such as road crossings, base of dams, or the confluence with other waters. Survey data collected is entered into the Bureau's Fisheries Management Database (FishTrack).

Field Sampling Protocol

Lakes

Dissolved oxygen and temperature profiles are performed during mid –August at the deepest point of the impoundment using a YSI Model 85 meter. 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.

Streams

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.

Opportunity – Interpolate data collected for Incidence of Occurrence development to determine if any modification to the Incidence is required to reduce the sampling distance from 182 meters to 150 meters. The reduction of sampling distance would allow for consistent sampling protocols between various research projects.

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 projects. 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. Data is recorded on the Bureau's Supplemental Field Survey Sheet-Fish Samples (Appendix D). 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 (Appendix D). 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 Low Gradient Habitat Assessment Data Sheet and High Gradient Habitat Assessment Data Sheet (Appendix D).

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.

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Management of Habitat

Overview

The future of coldwater fishes in New Jersey, particularly salmonids, will depend heavily upon managing their habitat and sustaining the health of ecosystems critical to their survival. In the face of human activities that continually disrupt the natural processes occurring within watersheds, this will be at times a daunting task for resource managers. Threats to New Jersey's coldwater resources and the continued survival of trout are warm summer water temperatures and degradation of the physical features of stream channels. Environmental regulations aid in balancing the needs of a natural environment with those of society.

Coldwater Fish Habitat

To survive, fish need a healthy environment that satisfies their life requirements. Fish habitat is aquatic space, as determined by chemical, physical, and biological factors. Habitat characteristics play a key role in determining fish assemblages (fish species and their numbers, and sizes). Habitat also influences biotic interactions (competition, predation) that affect fish communities. Three habitat factors that affect the distribution and abundance of trout in streams and lakes are water quantity, water quality, and in-stream habitat. The influence of these factors upon trout is described below in general terms with distinction made between flowing and standing waters. Additional information on habitat requirements necessary for survival of trout can be found under the Trout Life History and Ecology section of within this plan.

Habitat Factors Affecting Trout in Streams

<u>Water Quantity</u>
Streamflow is the volume of water flowing past a cross-section of the stream channel per unit time and is often expressed as cubic feet per second (ft^3/sec). Both overland runoff and groundwater are major sources of water inputs to streams. Many streams continue to flow even during periods when there is no rainfall or overland runoff and these are called perennial streams. Groundwater inputs (from the water table) often constitute much of the base flow (flow not the result of rainfall that creates surface runoff), particularly in headwater reaches of NJ streams where wild trout occur.

Streamflow generally follows predictable seasonal patterns (high spring flows and low summer flows) and can also experience short-term variability. High flows can be beneficial in terms of scouring pools, introducing woody debris, sorting streambed materials, and serving as cues for fish migration and spawning. Unfortunately, land use changes can significantly alter natural flow regimes by increasing overland runoff that causes disruptive or damaging flows. For example, increases in impervious surface within a watershed (buildings, roads, parking lots, etc) can result in flow extremes that lead to flooding, bank scouring, and habitat destruction. On the opposite end of the scale, extreme low flows can stress the fish community by reducing living space and impacting biotic interactions (feeding difficulties, increased vulnerability to predation, etc.). Stream flow can also affect other habitat factors important to trout such as water temperature and water quality.

Water Quality

Factors that determine water quality, such as water temperature, pH, turbidity, dissolved oxygen, alkalinity, dissolved nutrients, and presence or absence of anthropogenic toxicants can directly affect fishes or indirectly affect them through effects on food production (Orth and White 1999). Geology plays a major role in determining water quality, and other factors such as climate, stream geomorphology, watershed characteristics, and man's activities are also important. Water temperature is considered the primary factor limiting trout distribution and survival in New Jersey streams.

Many streams statewide that might otherwise consistently sustain trout year round fail to do so because ambient summer water temperatures exceed 21°C. Trout may find areas of thermal refugia during the summer (springs and groundwater upwelling) when summer water temperatures approach stressful levels. Riparian vegetation that shades water surface plays a critical role in maintaining cold summer water temperatures, particularly in smaller streams. As streams increase in size the ability of near stream vegetation to shade the stream decreases. Streamside vegetation also helps filter overland runoff before it reaches the stream. New Jersey streams that have cold water year round usually do not experience problems related to dissolved oxygen.

Alkalinity and pH can also affects a stream's suitability for trout. Some regions of the state have naturally occurring low pH and alkalinity levels. The ambient pH of waters in the south Jersey Pinelands (a region 1.1 million acres in size that occupies 22 percent of New Jersey's land area) is below 5.5 which is a deterrent to maintaining a short-term seasonal trout fishery through hatchery supplementation. The headwaters of north Jersey streams, particularly those in the Ridge and Valley physiographic province (Figure 1, p. 13) may also experience low pH levels due to the region's geology and soils. Low pH can also increase the toxicity of trace metals (i.e. aluminum) that are leached from the soil or come from airborne sources. When the buffering capacity of a stream is poor, as reflected by low alkalinity, a stream's susceptibility to acidification increases. The majority of the state's trout streams are low in alkalinity and relatively unfertile due to their association with sandstone, shale, and other noncarbonate rocks. These relatively unfertile streams are termed freestone streams. Limestone bearing rock formations that can increase alkalinity are known to occur in some watersheds, most notably the Paulinskill River. The impact this has on local fish production has not been examined.

Opportunity – Use existing or available water chemistry and geology data to identify trout streams that are potentially high in productivity and may have the potential to provide a more desirable fishery in terms of fish size or quantity through specialized management.

Physical Characteristics of the Stream Channel

Stream channels are dynamic and diverse, molded by unidirectional water movement and the transport of materials over geological formations. Channel features that influence trout abundance and size are channel sinuosity (meandering), pool-riffle sequences, water depth, substrate (bed materials), and cover.

Stream Habitat Threats & Concerns

Dams – Water impounded by an on-stream dam can eliminate or negatively impact riverine habitat both upstream and downstream of the barrier. Impounded water is susceptible to excessive warming during the summer, and warm water can cause stressful or lethal water temperatures for coldwater fishes residing in both the impounded area and downstream. Silt and sediment that collect behind the dam can impact in-stream habitat by smothering spawning sites and macroinvertebrate species that are important prey items for fishes. Downstream flow can also be reduced, particularly during the summer and periods of drought. Dams are potential barriers to fish movement, and this is a particular concern on streams that have spawning populations of trout, which may affect their ability to migrate upstream to reach spawning grounds. For these reasons the construction of on-stream dams on coldwater should not be allowed or greatly discouraged.

Whether built for recreation, water diversion, hydropower, potable water, flood control, or other reasons, manmade dams are responsible for damaging more trout habitat in New Jersey streams than would first seem apparent. Many on-stream dams built long ago to harness the power of water, such as mill dams and diversion dams, still exist today despite having outlived their usefulness. The Musconetcong River is a prime example of a trout stream whose physical habitat and water quality has been impacted or eliminated by antiquated on-stream dams. Nonfunctional dams such as these should be demolished (or breached) whenever possible and practical, and the stream restored to its original condition.

Finding solutions to problems caused by existing manmade ponds, lakes, and reservoirs, that currently provide a useful function to their owners but also impact coldwater resources, can be more challenging because permanent dam removal is not usually an option. To resolve a problem it may be necessary to develop a set of practices tailored to the specific situation, that are designed to avoid or minimize aquatic resources impacts. For example, the manipulation of water in a series of potable water supply reservoirs in the Pequannock River watershed has resulted in fluctuations in the quantity and quality of water released downstream (insufficient in-stream flows, primarily during the summer, or the release of excessively warm water, anoxic water, or water laden with hydrogen sulfide), that has caused mortality of wild brown trout.

When maintaining minimum flows during the summer, the release of cold water from the hypolimnion, rather than warmer surface water, is sought in order to maintain coldwater aquatic resources downstream. However, the benefit of a coldwater release may be negated if this water is deficient in dissolved oxygen, especially when laden with hydrogen sulfide. When unusual conditions such as this prevail, a bottom water release may not be in the best interests of the resource and modification of the release regime may be warranted (i.e. aeration of reservoir releases through air injection or mechanical agitation, mixing of surface and bottom waters, siphon, spillway modification, aeration weir, etc.). For the Pequannock River situation, an adaptive management strategy is being employed, with DFW, sister DEP agencies, conservation organizations, and the owner partnering to explore alternatives and develop a long-term solution to this problem.

Manmade structures are not the only type of dams that pose serious threats to the state's trout streams. Over the last few years, the DFW has increasing received complaints from conservation groups concerning the presence of beaver dams on some of the state's best trout streams, particularly in the Big Flatbrook, Pequannock River, and Van Campens Brook watersheds. Significantly elevated stream temperatures, as a result of beaver dams, have been documented by the Pequannock River Coalition on streams in the Pequannock River watershed. Staff from the Bureau of Freshwater Fisheries and DFW's Wildlife Control work cooperatively to address and resolve problems caused by beaver dams, which has resulted in the selective removal of beaver dams to restore trout habitat.

<u>In-stream flow</u> Maintenance of in-stream flows, particularly during periods of drought, is a concern. Water withdrawals for agricultural and other uses that coincide with dry weather can diminish flows on streams whose flows are already reduced. See also "Dams."

<u>Loss of wetlands and buffers</u> These areas are invaluable in maintaining flow and filtering runoff. The loss or diminished function of these areas, particularly those closely associated with trout production streams, would be detrimental.

<u>Loss of nearstream vegetation</u> The removal or loss of nearstream vegetation, particularly on the headwaters of trout stream, can result in undesirable thermal warming patterns. Construction activities in stream corridors such as road widening, bridge and culvert construction, etc. have resulted in short term or permanent losses of nearstream vegetation. Livestock grazing that destroys nearstream vegetation, causing unstable banks, has been observed along trout production streams and could be prevented or minimized through fencing.

<u>Roadway culverts</u> Improperly designed or installed culverts can prevent or impede fish passage and can be particularly problematic during low and high flow situations. In-stream fish habitat can also be lost if native substrate is not re-established in the culvert

<u>Nonpoint source pollution</u> Land disturbances within the watershed can increase pollutants. Runoff from roadways and a variety of sources may not pass through quality basins or other filtering devices prior to entering the stream. Pollutants such as road salts, oil and grease, and other contaminants can be problematic for trout. Silt is frequently a primary constituent of nonpoint pollution and is a major threat to the state's trout resources. Runoff from poor farming practices and land disturbances are major contributors of silt.

<u>Point source pollution</u> Discharges emanating from a point sources, such as wastewater from treatment plants, noncontact cooling water, etc can cause summer thermal alterations and increased pollutant loads that can stress or kill trout.

<u>Channelization, channel relocation and stream cleaning</u> The first of these two activities are occasionally performed as part of stream crossing and road widening projects. Municipalities, county Mosquito Commissions, and farmers are probably most active in stream cleaning activities intended to improve runoff patterns. These small-scale projects can cause localized damage by leaving a uniform stream bottom devoid of cover and

structure for fish. Beneficial woody debris, that should be left in the stream channel unless causing a significant blockage, may often be removed under the guise of stream cleaning.

Global warming Climatic changes associated with global warming may pose a problem for those trout streams in New Jersey where summer water temperatures approach critical levels for trout survival.

Habitat Factors Affecting Trout in Ponds & Lakes

Water Quantity
Water quantity, in and of its self, is generally not considered limiting for trout in most New Jersey ponds and lakes, but can be affected by demands for drinking water.

Water Quality
External factors, such as geology, land use (human disturbance), and climate, largely determine the water quality of ponds and lakes. As with streams, prevailing low pH that occurs in certain regions (Pinelands and Ridge and Valley) limits trout survival and opportunities to establish trout fisheries in these areas through stocking is therefore limited. In most New Jersey ponds and lakes seasonal variations in temperature and dissolved oxygen play the biggest role in determining their ability to support trout year round.

During the spring these water quality parameters are generally not limiting for trout. However, as spring progresses rising air temperatures cause surface waters to warm to levels that can not be tolerated by trout. This scenario occurs on all but the smallest of spring fed ponds statewide. During the summer, decomposing organic material depletes oxygen in the bottom waters. Although cold water temperatures suitable for trout are present in the bottom waters of many moderately deep lakes in the summer, satisfactory dissolved oxygen levels are typically absent. Consequently few standing waters in New Jersey have the ability to consistently support trout year round. A number of northern lakes that had good holdover trout fisheries 30 to 40 years ago (Lake Hopatcong, Swartswood Lake, Cranberry Lake, Mountain Lake) have seen their trout fisheries decline, presumably as a result of nutrient inputs arising from watershed development that have accelerated eutrophication. Only a handful of deeper lakes and reservoirs statewide are able to consistently maintain favorable water quality for trout in the summer.

Physical Characteristics
Trout habitat in lakes is influenced by lake morphometry (shape and contour), with depth the primary consideration in New Jersey waters. While natural lakes and ponds do occur, more often than not standing waters have been artificially formed (and natural lakes increased in size) through dam construction. Lakes less than 30 to 40 feet deep rarely support trout in the summer due to water quality conditions. Even lakes as deep as 50 or 60 feet may experience water quality problems. Substrate plays a minor a role in influencing coldwater spawning habitat in New Jersey lakes. Only lake trout, an introduced salmonid species, is know to reproduce successfully (in Round Valley Reservoir) by spawning over the boulders at the dams.

Lake Habitat Threats & Concerns

Eutrophication Man's activities in the watersheds of many New Jersey lakes have accelerated the rate of eutrophication, which influences the availability of summer trout habitat. The owners of several lakes (Swartswood Lake and Culvers Lake) are trying to control the cycling of nutrients through the operation of a hypolimnetic aeration system. This system is capable of increasing the volume of summer trout habitat, but has had minimal success in doing so at Swartswood Lake.

Opportunity – The DFW should work more closely with the N. J. Division of Forestry and Parks to determine if operational changes regarding the hypolimnetic aeration system at Swartswood Lake would result in an improvement in summer trout habitat.

Water level fluctuations The demand for water, particularly drinking water, will likely increase in the future and cause greater variability in the water levels of reservoirs that sustain trout year round. While not currently considered a significant problem, this has the potential to disrupt the fisheries in Round Valley and Merrill Creek Reservoirs.

Zebra mussel This invasive, exotic mussel has not been documented in New Jersey. However, New Jersey anglers boat in waters of other states (NY and PA) that contain this species and could unwittingly transport this undesirable bivalve to New Jersey. The zebra mussel reproduces prolifically and could adversely affect spawning habitat for lake trout in Round Valley if a population became established. Because they are filter feeders they could also dramatically affect the plankton population, which in turn could negatively impact the alewife forage base that the salmonids depend upon.

Habitat Protection Through Regulatory Programs

New Jersey has a variety of regulatory programs governing activities that affect environmental quality, which are administered by the Department of Environmental Protection.

Surface Water Quality Standards

New Jersey's *Surface Water Quality Standards* (SWQS) is perhaps the strongest line of defense in protecting open state waters. This legislation establishes surface water criteria for approximately 120 substances and water quality parameters such as pH, temperature, dissolved oxygen, and dissolved solids that can vary according to stream classification. Criteria for certain substances (temperature, dissolved oxygen, and suspended solids) are more stringent for trout waters than for nontrout waters and applicable limits depend upon on a waterway's classification. Trout production waters are designated as Category I, one of the Department's highest levels of protection, which mandates an anti-degradation standard for a number of identified water quality parameters. The importance of the Surface Water Quality Standards is emphasized by devoting an entire section of this plan to the classification of trout waters, which describes the state's stream classification system which is an integral part of the SWQS. The SWQS are administrated by DEP's Bureau of Water Quality Standards and Assessment.

Stormwater Program

In 2004, new stormwater rules established a comprehensive framework for addressing water quality impacts associated with existing and future stormwater discharges.
The newly adopted Stormwater Management Rules emphasize low impact building techniques that will prevent and minimize impacts on new development sites by using both structural and non-structural techniques such as minimizing land disturbance, minimizing impervious cover, infiltration basins, and vegetative filters. These rules set forth the required components of regional and municipal stormwater management plans and establish the stormwater management design and performance standards for new (proposed) development. The design and performance standards for new development include groundwater recharge, runoff quantity controls, runoff quality controls, and buffers for Category One waters (NJDEP website 2005). The rules will minimize the impacts on trout production streams by controlling development within a 300-foot buffer around high quality waters that include trout production waters.

Highlands Protection

In August 2004, the Highlands Water Protection and Planning Act was signed in order to preserve open space and protect the state's greatest diversity of natural resources including the precious water resources that supply drinking water to more than half of New Jersey's families. The Highlands Preservation Area, over 800,000 acres spanning portions of seven counties and 88 municipalities, encompasses a large majority of New Jersey's trout production waters. This historic law will protect drinking water for over 5.4 million people, preserve open space and provide effective regional planning for the Highlands region. The law will be implemented by the *Highlands Water Protection and Planning Council*, a public body charged with developing a regional master plan, performing land use functions and protecting the region's critical environmental areas and high resource lands. Many of the state's coldwater resources can be found in this mountainous region, particularly trout production streams, which should reap the benefits of this important legislation.

Stream Encroachment Program (Floodplain Control)

Many construction activities proposed within floodplains and adjacent to open waters (streams and lakes) are required to obtain stream encroachment permits. Stream crossings, stormwater discharges, placement of structures, dredging, and stream cleaning projects are examples of different types of regulated activities. Over 1,000 project applications received by DEP's Land Use Regulation Program are forwarded annually to DFW's Office of Environmental Review for review and comment. Technical comments solicited from staff experts are coordinated through this office and returned to the appropriate agency responsible for permit issuance. Recommendations involving timing restrictions, fish passage designs for culverts, and buffers are prime examples of ways in which the DFW attempts to minimize disturbances and impacts on fish and wildlife resources.

Timing restrictions are a particularly important tool that is frequently employed to minimize the impacts of regulated land use activities on the state's coldwater resources. Near or in-stream sediment generating activities, typically prohibited during critical time periods to avoid or reduce the impacts of sediment on the aquatic biota and recreational opportunities, are as follows:

Stream Classification	Timing Restriction
Trout production waters	September 15 to March 15
Trout maintenance or trout stocked waters	March 15 to June 15
Non-trout waters	May 1 to June 30

The DFW also provides recommendations for the designs of culvert crossings to help minimize project impacts and ensure adequate fish passage is incorporated into the design. For trout production streams, full spans (bridges) are recommended to maintain critical substrate and to provide unimpeded fish passage. Much less preferred, three sided and box culverts may be used in trout maintenance and non-trout streams. The impact of a box culvert can be minimized, to a certain degree, by placing the culvert floor below grade and back filling with stockpiled native stream substrate material. The DFW also discourages the use of rip rap within the stream channel because the rock used is often oversized to protect against damaging for heavy storm events and can an impediment to fish passage.

Freshwater Wetlands Program

Environmentally sensitive freshwater wetlands are regulated through the Freshwater Wetlands Protection Act Rules (N.J.A.C. 7:7A). Transition areas (buffers) around freshwater wetlands in trout production watersheds are increased to150 feet, while wetlands associated with trout maintenance waters receive protection through a 50-foot buffer zone. Wetland preservation is especially important in watersheds where small trout production streams occur because wetlands filter stormwater runoff and maintain and supplement stream flows.

Pesticide Control Program

Many New Jersey lakes suffer from accelerated rates of eutrophication, which is often evidenced by the presence of extensive aquatic vegetation growth within the waterway. As a result, the application of herbicides for aquatic vegetation control is quite common throughout the state. One common herbicide treatment for algae is copper sulfate and trout are intolerant of even very low concentrations of copper. Working closely with the Pesticide Control Program staff, DFW biologists identify trout production, trout maintenance, and trout stocked water where the use of copper sulfate may prove problematic. Through the use of timing restrictions, and reduced herbicide concentrations impacts to the State's trout streams are minimized.

Habitat Preservation

Due to the rapid pace of land development in New Jersey (Figure 3), perhaps the best way to ensure the long-term survival of coldwater resources is to purchase and set aside for posterity not just coldwater stream corridors and lakes, but adjacent riparian and upland property within the watershed. It is far easier to preserve coldwater resources than to restore them once they have been degraded. Although this may be the most cost-effective approach in the long run, property values in New Jersey continue to rise, and this form of habitat protection becomes increasingly cost prohibitive. An alternative approach may involve the purchase of conservation easements that restrict land development.

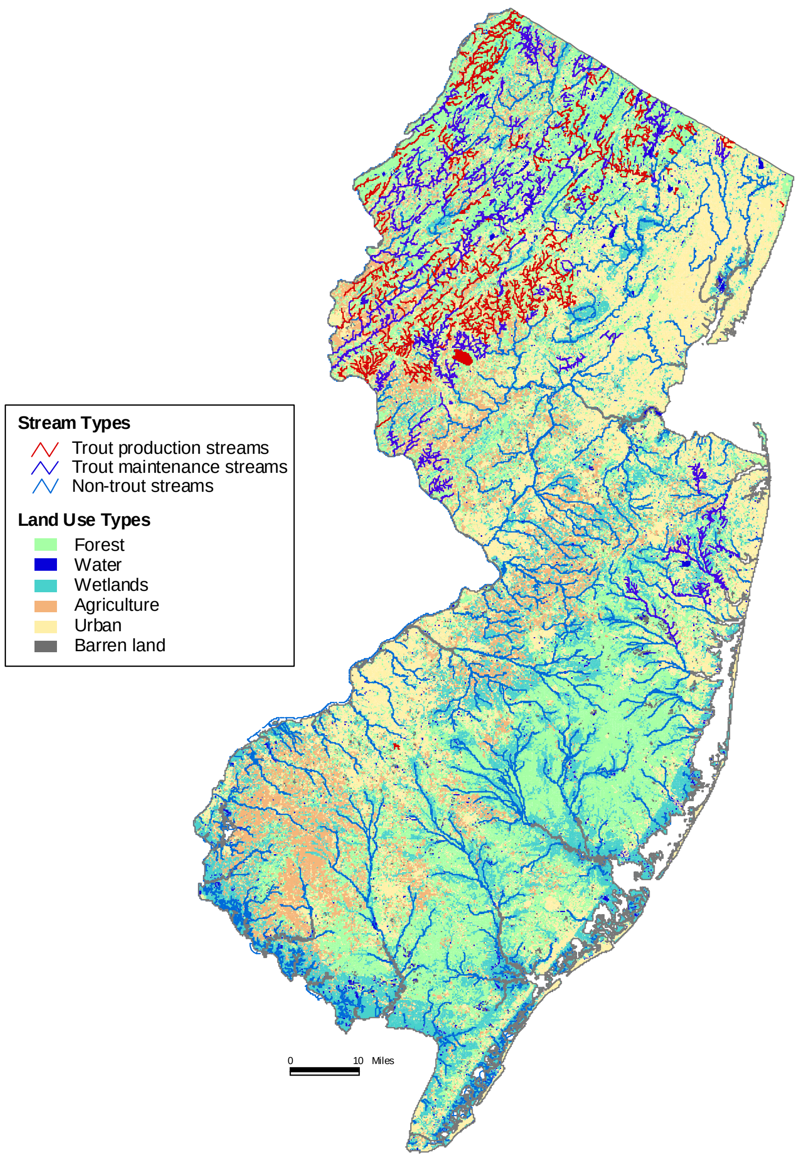


FIGURE 3. New Jersey's trout waters (2004) shown in relation to 1995-97 land use cover.

There has been significant effort statewide to preserve open space in the face of increasing land development pressures, and the state's Green Acres Program has been instrumental in this process. Green Acres serves as the real estate agent for NJDEP and acquires land, using money derived from the issue of state bonds. Acquisitions are then assigned to the DEP's divisions for management and become part of a system of state, parks, forests, natural areas, and wildlife management areas. In addition, the Green Acres Program provides low interest loans and grants to municipal and county governments to acquire open space and develop outdoor recreation facilities. Green Acres also provides matching grants to nonprofit organizations to acquire land for public recreation and conservation. A tax exemption program, also administered by Green Acres, allows eligible nonprofit organizations that own recreation or conservation land to be exempt from local property taxes if they permit public use of their private lands.

Because the owners of land purchased or exempted through Green Acres programs are required to allow public access, these types of land transactions are particularly desirable. Acquisition of river corridors is a high priority within Green Acres programs and significant acquisitions have been along major trout streams in north Jersey, most notably the Musconetcong and Pequest Rivers. Many county and local governments have also enacted an open space tax that is used to acquire land, often with Green Acres assistance. However, when land is not purchased with Green Acres funding the owner can and has limited public access.

Opportunity – Prioritize coldwater resources for the purpose of acquisition and/or easements and provide to the NJDEP Green Acres Program.

Habitat Restoration and Improvement

Restoration of habitat implies that resource damage has occurred, either at the hands of Mother Nature, mankind, or both, and that intervention is required in order to restore resource health. Restoration and improvement efforts aimed at achieving desired responses in trout populations traditionally relied upon the placement of in-stream devices. Managers today increasingly use an ecosystem approach to correct habitat degradation and deficiencies.

Many New Jersey's coldwater streams would benefit from some form of habitat restoration or improvement. In the past DFW has planned, performed and partnered on six fish habitat improvement and stream restoration projects since 1995, primarily in connection with the "Restore Our Streams" workshop. Although conservation groups and landowners often express interest in cooperative habitat restoration projects the DFW has difficulty accommodating these requests due to severe staffing and funding shortages.

Opportunity – Investigate the feasibility of using Natural Resources Damages money to fund a staffing position dedicated to the restoration and enhancement of coldwater fish habitat.

Opportunity – Work with DEP Land Use Regulation to obtain a blanket permit for habitat work that will streamline the permit process.

Management of Wild Trout

Overview

New Jersey has a surprising abundance and variety of self-sustaining wild trout populations. Brook trout, the state's only native salmonid, occurs most often, followed by brown trout, rainbow trout, and lake trout. Populations of wild brook, brown and rainbow trout inhabit nearly 1,000 miles of streams located in small, upland streams in the northern tier of the state. The state's second largest impoundment supports a reproducing lake trout population. Wild trout are important indicators of high water quality and the ability of waters to support reproducing trout populations is recognized and protected through NJDEP regulatory programs. They also represent a renewable resource that can and does provide angling recreation without the economic cost of stocking. Strategies that guide DFW wild trout management efforts include activities related to inventorying, monitoring, habitat preservation and restoration, and education and communication.

Importance of Wild Trout

Trout that are able to complete their life cycle in a natural aquatic habitat, and maintain a population through natural reproduction, are termed wild trout. The survival of self-sustaining populations of wild trout is not dependent upon the stocking of hatchery-reared trout. Because of their high water quality and habitat requirements, trout are valuable indicators of healthy aquatic ecosystems. The importance of water quality, as related to the ability of a stream or lake to support wild (reproducing) trout populations is recognized in New Jersey through the state's surface water classification system. Waters that support reproducing trout populations are referred to as "trout production waters" and are classified as FW2-Trout Production Category 1 (FW2-TP(C1)). Through this classification trout production waters receive one of the highest levels of protection available from activities that could potentially impact coldwater quality and habitat, through a variety of NJDEP regulatory programs (see Classification of NJ Trout Waters section).

Wild trout are a renewable resource that help provide a diversity of desirable trout angling opportunities without the cost of stocking hatchery-reared trout costs. Though generally smaller than their hatchery-reared counterpart, wild trout tend to be more colorful and challenging to catch. They are valued by anglers who enjoy fishing for naturally reproduced trout found in many small streams that typically flow into larger, trout-stocked streams. In a survey of New Jersey trout anglers, 20 percent indicated that they fished for wild trout in 2002 (Responsive Management 2003). Streams that are home to wild trout are also highly regarded by recreationists other than anglers (hikers, birders, and the occasional canoeist or kayaker) who are attracted to these aquatic ecosystems. Not only are there tangible economic benefits resulting from these recreational activities, perhaps more importantly are the intangible benefits to all residents that reflect quality of life values.

New Jersey's Wild Trout Resources

Currently nearly 1,000 miles of streams, or five percent of streams statewide, in New Jersey contain populations of wild brook, brown, and rainbow trout (Table 5). A reproducing population of lake trout has been established in a 2,365-acre reservoir. Three watersheds, the Upper Delaware, upper Raritan (North and South Branches), and Pequannock are particularly rich in wild trout resources (Figure 4). On average 30 percent of the streams in these watersheds are inhabited by wild trout populations and statewide, 80 percent of the wild trout streams occur in these three watersheds (Table 5).

Of the four salmonid species that currently reproduce in New Jersey freshwaters, only the brook trout, whose ancestors colonized this region following deglaciation 12,000 years ago, is native to the state. Over the last century reproducing populations of three non-native trout species (brown, rainbow, and lake trout) have become established through stocking efforts intended to replenish depleted populations and enhance recreational angling. Although historical information regarding the occurrence of trout in New Jersey dates back to the late 1800's, organized scientific efforts to collect empirical data on wild trout populations did not begin until the late 1960's. From 1968 to 1972 a research study conducted by DFW documented the occurrence and distribution of trout statewide, including the occurrence of wild trout populations in 75 streams (or stream segments). Since then, DFW has conducted stream surveys annually to identify additional wild trout streams and occasionally monitor the status of previously documented wild trout populations. To date, reproducing salmonid populations have been documented in 175 streams or stream segments and one lake (Appendix B, Part II).

Wild trout require cold water temperatures year round and a rocky substrate suitable for spawning in order to survive and reproduce. The occurrence of these habitat essentials in New Jersey is strongly influenced by the temperate climate and physiogeography. Habitat suitable for wild trout populations can be found primarily in small streams scattered throughout the Appalachian foothills and mountains within two northern physiographic provinces (Ridge and Valley, and Highlands) (Figure 5). The elevation and topography associated with these regions help provide and maintain cold summer water temperatures (through springs and groundwater inputs) and good physical habitat (pools and riffles, rocky substrate). Over 90 percent of New Jersey's trout production streams are located in these regions and most can be characterized as freestone streams, steep to moderate gradient, variety of high quality in-stream habitat, low temperature, well oxygenated waters that are relatively unfertile. Physical habitat (pool depth and woody debris) is believed to have the greatest influence in fish size and abundance.

The status of the four salmonid species that reproduce naturally in New Jersey waters is briefly summarized later in this section.

TABLE 5.— Land area, total stream length and proportion of trout production streams for each watershed management area in New Jersey, as documented through DFW surveys conducted from 1968 through 2003.

Watershed Management Area	Watershed land area		Total length of all streams		Total length of trout production (wild trout) streams		Percentage of trout production streams
	(km^2)	(mi^2)	(km)	(mi)	(km)	(mi)	(%)
1	1931.37	745.71	1927.73	1197.83	561.00	348.59	29.1
2	539.76	208.40	630.78	391.95	51.01	31.70	8.1
3	616.05	237.86	754.31	468.71	233.87	145.32	31.0
4	488.24	188.51	458.91	285.16	14.24	8.85	3.1
5	427.47	165.05	515.26	320.16	1.51	0.94	0.3
6	936.25	361.49	1142.58	709.96	127.62	79.30	11.2
7	465.02	179.55	276.82	172.01	0	0	0
8	1212.89	468.30	1374.26	853.92	483.11	300.19	35.2
9	910.71	351.63	1047.12	650.65	0	0	0
10	737.12	284.60	782.18	486.02	0	0	0
11	704.25	271.91	882.26	548.21	75.07	46.65	8.5
12	1204.36	465.01	1198.39	744.65	0	0	0
13	2056.81	794.14	2593.58	1611.58	0	0	0
14	1700.36	656.51	2587.53	1607.82	0	0	0
15	1624.31	627.15	2161.26	1342.94	0	0	0
16	866.42	334.53	2130.73	1323.97	0	0	0
17	3194.12	1233.26	4650.33	2889.58	0	0	0
18	1013.58	391.35	1156.92	718.88	4.71	2.92	0.4
19	908.52	350.78	1365.04	848.20	0	0	0
20	655.25	252.99	1066.59	662.75	0	0	0
Total	22192.85	8568.71	28702.58	17834.95	1552.14	964.46	100

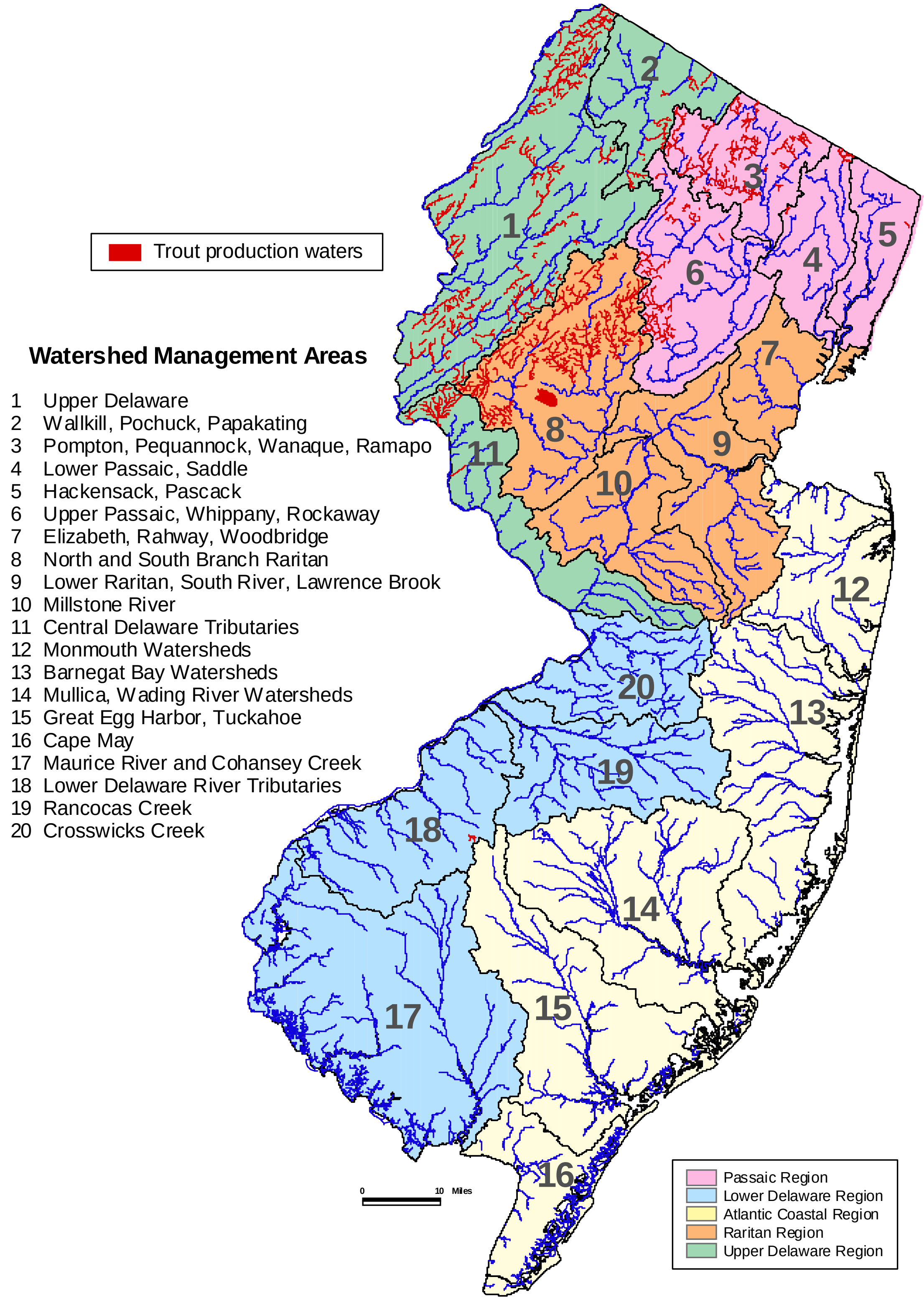


FIGURE 4.— New Jersey's watersheds and freshwaters having known reproducing salmonid populations (trout production waters) as documented through DFW surveys conducted from 1968 through 2003.

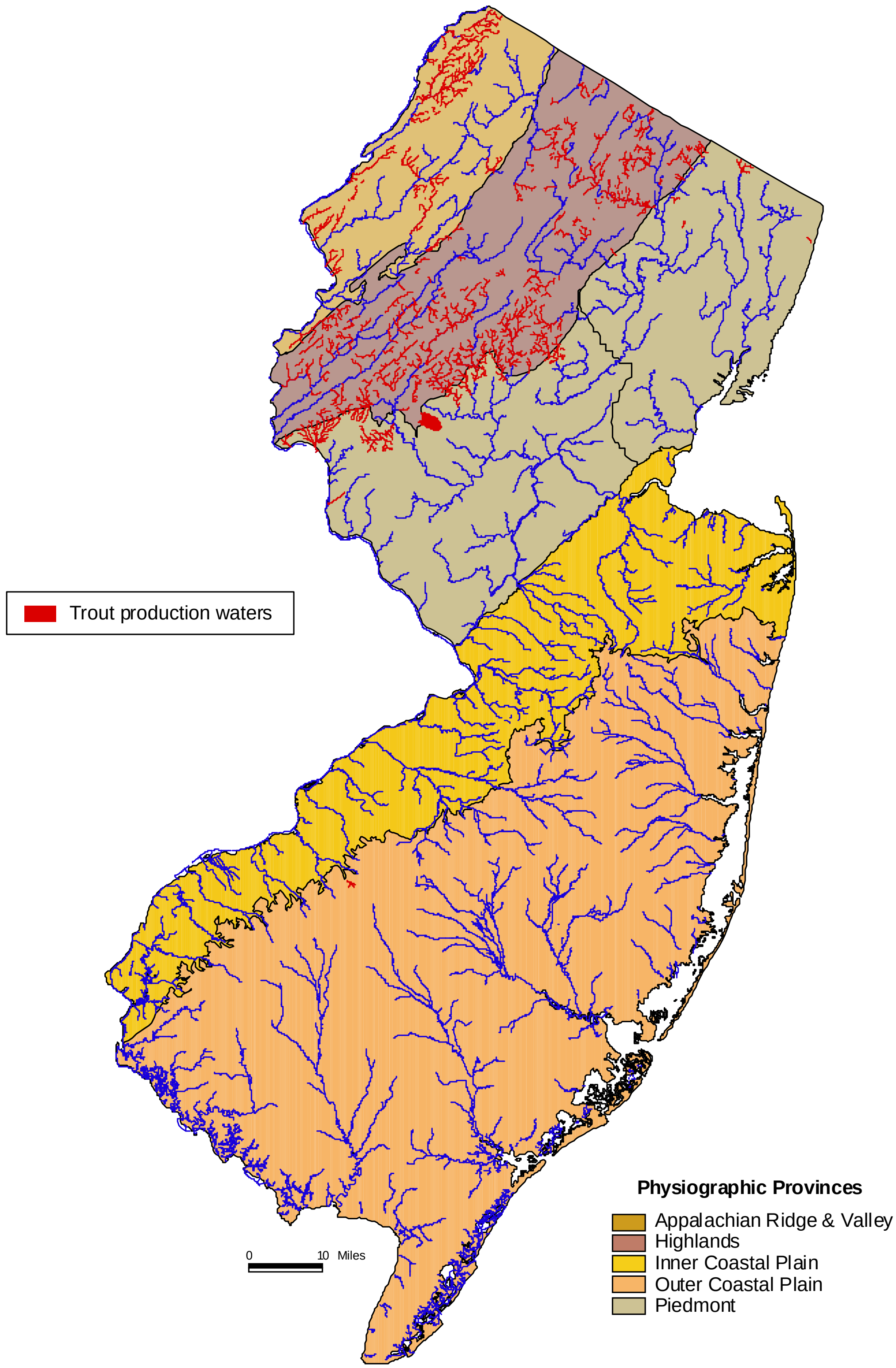


FIGURE 5.— New Jersey's physiographic provinces and freshwaters having reproducing salmonid populations (trout production waters) as documented through DFW surveys conducted from 1968 through 2003.

Brook Trout (*Salvelinus fontinalis*)

The brook trout is New Jersey's only native salmonid and in 1992 was officially designated the state fish. Wild brook trout populations occur in streams located in seven northern counties (Sussex, Warren, Morris, Passaic, Bergen, Hunterdon, and Somerset Counties), and in one stream located in a southern county (Camden County). Reproducing populations have been confirmed in 121 streams or stream sections, and in 94 of these, brook trout is the sole salmonid inhabitant (Figure 6). The introduction of non-native salmonids, through widespread stocking over the last century, resulted in the establishment of reproducing populations of wild brown and rainbow trout, some of which co-exist with brook trout or may have displaced brook trout. Of 27 streams co-inhabited by brook trout and at least one nonnative salmonid, brown trout occur in 23, rainbow trout in one, and all three species occur in three streams.

The occurrence of brook trout would perhaps be more widespread, however competition with the more aggressive brown trout, and the brook trout's noted vulnerability to angling and preferences for colder temperatures, have undoubtedly helped to relegate brook trout to colder headwater streams. This has been casually observed in a number of streams, most notably in Van Campens Brook. In headwater streams, brook trout are typically small and seldom achieve sizes greater than 12 inches, with 5 - 10 inches the size range typically observed for the majority of adult fish. The brook trout's small size (in terms of both population and individual fish) and confining habitat undoubtedly influence angler preferences. The majority of trout anglers (82 percent) fish in waters that are stocked with cultured trout that average 10.5 inches (Responsive Management 2003). Twenty of the 35 streams currently regulated as *Wild Trout Streams* contain wild brook trout populations.

In 2004 a unique partnership, the Eastern Brook Trout Joint Venture (EBTJV), was formed to unify range-wide efforts to protect, restore, and enhance aquatic habitat of brook trout in the eastern U.S. EBTJV is the nation's first pilot project under the National Fish Habitat Initiative (www.fishhabitat.org). This collaborative, multi-state endeavor involves state and federal agencies, regional and local governments, businesses, conservation organizations, academia, scientific societies, and private citizens. DFW participates in the EBTJV by providing data for the range-wide assessment and assisting in the development of a conservation plan and strategies to deal with threats to brook trout and their habitat.

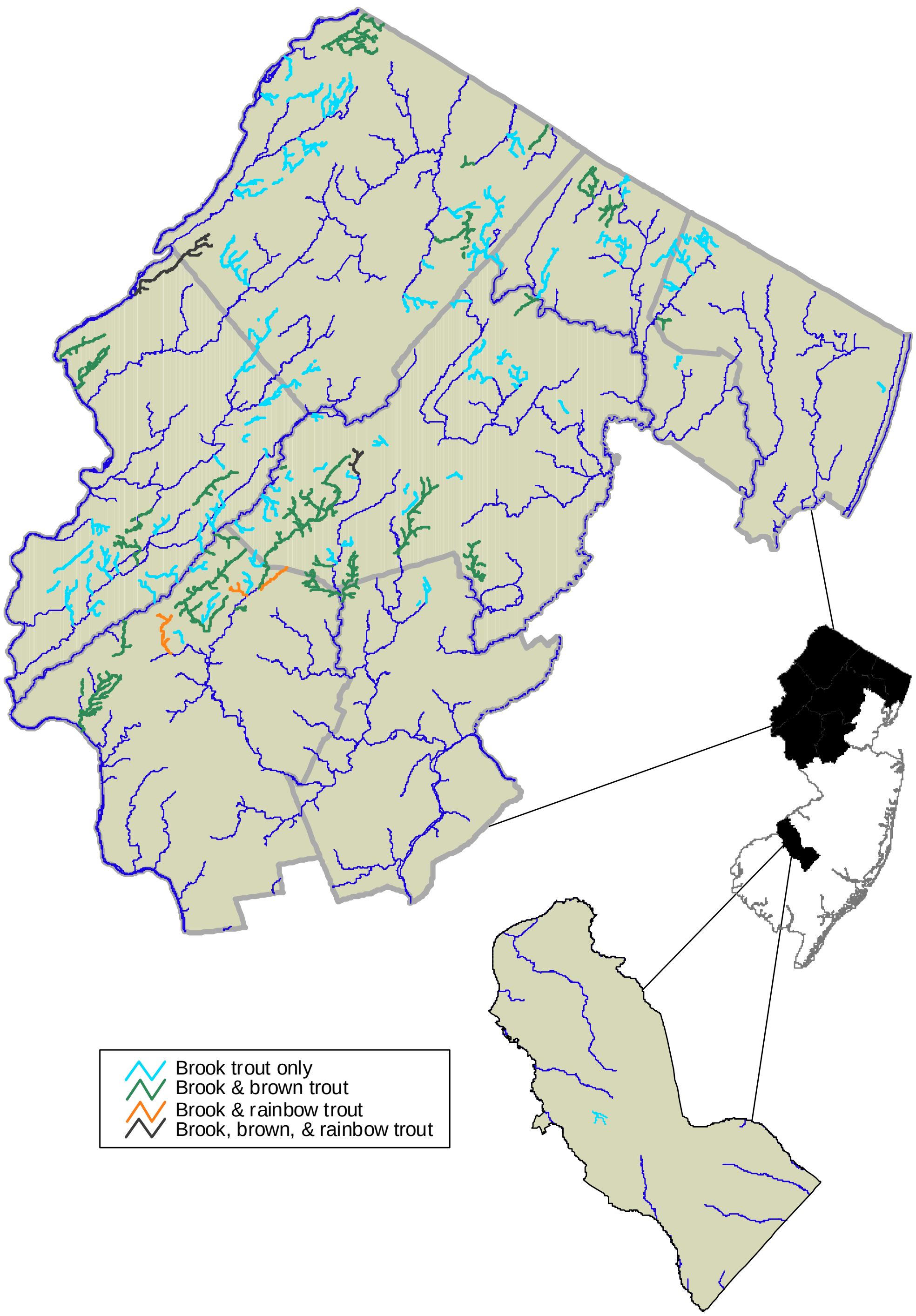


FIGURE 6.— Distribution of wild brook trout in New Jersey as documented through DFW surveys conducted from 1968 through 2003.

The first goal of the Venture was to assess the current status of brook trout within their historic range. With the exception of New York, where 5th level watershed were used, 6th level Hydrologic Unit (HU) watersheds (subwatersheds) were selected for the assessment since they were the smallest size watershed with current available data and provide a reasonable scale for future development of conservation management strategies (Hudy and Thieling 2005). These subwatersheds average approximately 34 square miles in size.

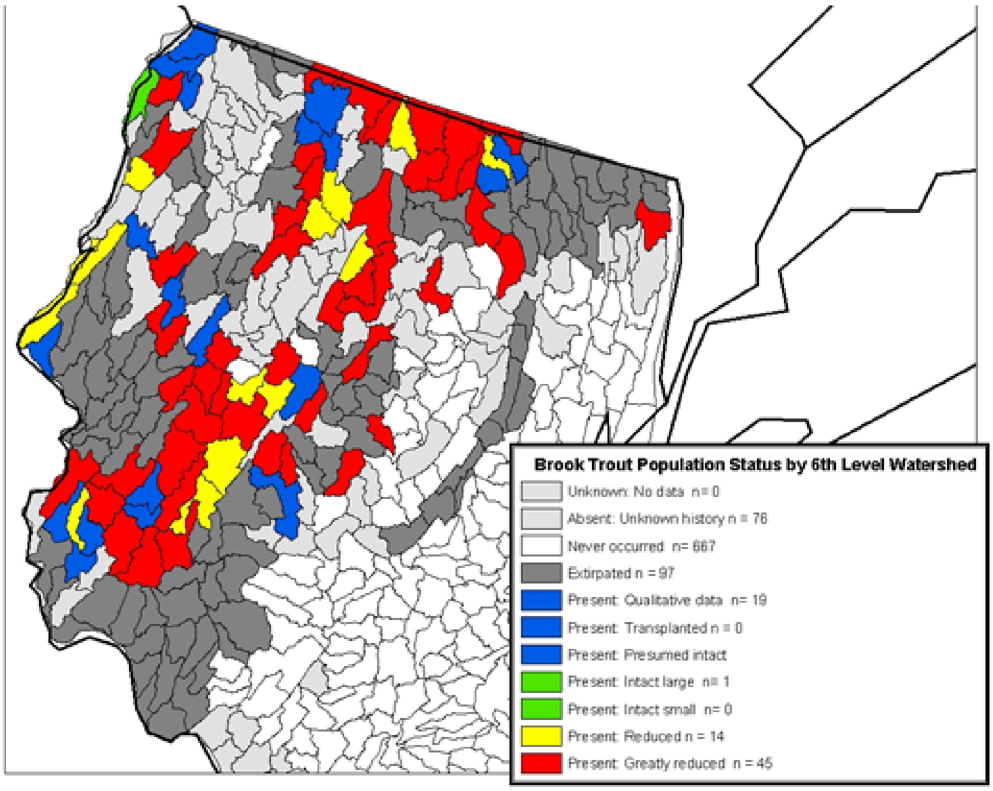
A classification system was designed and used to consistently determine the percentages of lost self-sustaining brook trout habitat within each subwatershed. For example, the presence of self-sustaining non-native coldwater fish species within the native range of brook trout was considered evidence that brook trout should have occurred in that habitat. Initial classifications were later validated during site visits with EBTJV partners from the U.S. Forest Service's Fish and Aquatic Ecology Unit to ensure consistent assessments among the states. The watershed level brook trout classifications and summary characteristics can be summarized as follows:

Classification	**Summary Characteristics**
Unknown	No data or not enough to classify further
Absent: unknown history	Brook trout currently not in watershed; historic status unknown
Never occurred	Historic self sustaining populations extirpated
Extirpated	All historic self-sustaining populations extirpated.
Present: Qualitative	No quantitative data; qualitative data show presence
Present: Intact	High percentage (> 90%) of historic habitat occupied by self sustaining populations
Present: Reduced	Reduced percentage (50% to 90%) of historic habitat occupied by self-sustaining brook trout
Present: Greatly reduced	Greatly reduced percentage (1% to 49%) of historic habitat occupied by self-sustaining brook trout.

In this study, 11,374 subwatersheds within the native range of brook trout in the eastern U.S. were classified. Brook trout were found persisting in 3,344 subwatersheds and have been extirpated from 1,166 subwatersheds. Of the 3,344 subwatersheds where self-sustaining populations of brook trout persist, the following statistics indicate substantial losses have occurred in these subwatersheds:

45% have lost over 50% of the habitat supporting self-sustaining brook trout;
15% have lost 10 - 49% of the habitat supporting self-sustaining brook trout; and
9% remain intact, having lost less than 10% of the habitat supporting self-sustaining brook trout

The status of New Jersey's self-sustaining brook trout populations is even more disturbing than these range-wide statistics (see color-coded map below). Of 919 subwatersheds statewide, self-sustaining brook trout populations are present in 79 (red, yellow, green, and blue areas), are believed extirpated from 97 subwatersheds (55% of the habitat historically occupied by self-sustaining populations – dark gray areas), and never occurred in 667 subwatersheds (white areas). These numbers may change since the historical range of brook trout is unknown for 76 subwatersheds (light gray areas) and the status of existing self-sustaining populations is uncertain in 19 watersheds (blue areas).



Opportunity - Continue to document brook trout distribution in New Jersey, with particular focus on subwatersheds where the brook trout status is currently classified as unknown.

Opportunity - Sample stream segments in 6th level HUC units where self-sustaining populations of brook trout are present, but the extent of their occurrence is uncertain (blue areas on map).

Another component of the range-wide assessment was the identification of key stressors to brook trout populations within the subwatersheds. Across its historic range, the top five stressors to brook trout populations were: increased water temperatures (20%), agriculture (15%), urbanization (10%), one or more exotic fish species (7%), and degraded riparian habitat (7%). In New Jersey, the top five stressors to brook trout populations were very similar to the range-wide stressors, with the notable exception that dams replaced agriculture as the second highest stressor. Additional information on key stressors and their effects on this important indicator species can be found in the EBTJV's 2005report entitled "Conserving the Eastern Brook Trout: An Overview of Status, Threats, and Trends."

Opportunity - Develop and implement a conservation plan specific to brook trout, that dovetails with the EBTJV, to ensure the long-term survival of New Jersey's state fish and only native salmonid.

Opportunity - Investigate the current status of brook trout and determine if a special designation (i.e. Species of Special Concern, Threatened, etc.) is warranted.

Brown Trout (*Salmo trutta*)

First introduced to New Jersey in 1908, this European salmonid has established reproducing populations in 76 streams (or stream sections) in the northern half of the state (Figure 7). Of these streams, 23 are also inhabited by brook trout, four by rainbow trout, and three streams are inhabited by all three salmonid species. The brown trout is generally more tolerant of warmer water and more aggressive and dominant over the other two salmonid species. These traits have likely resulted in the displacement of brook trout from their natal streams or relegated brook trout to upstream headwater areas less favorable for brown trout. Wild brown trout tend to grow to a larger size (15 inches) and can be more difficult to catch with hook and line, and these qualities make them an attractive quarry for trout anglers.

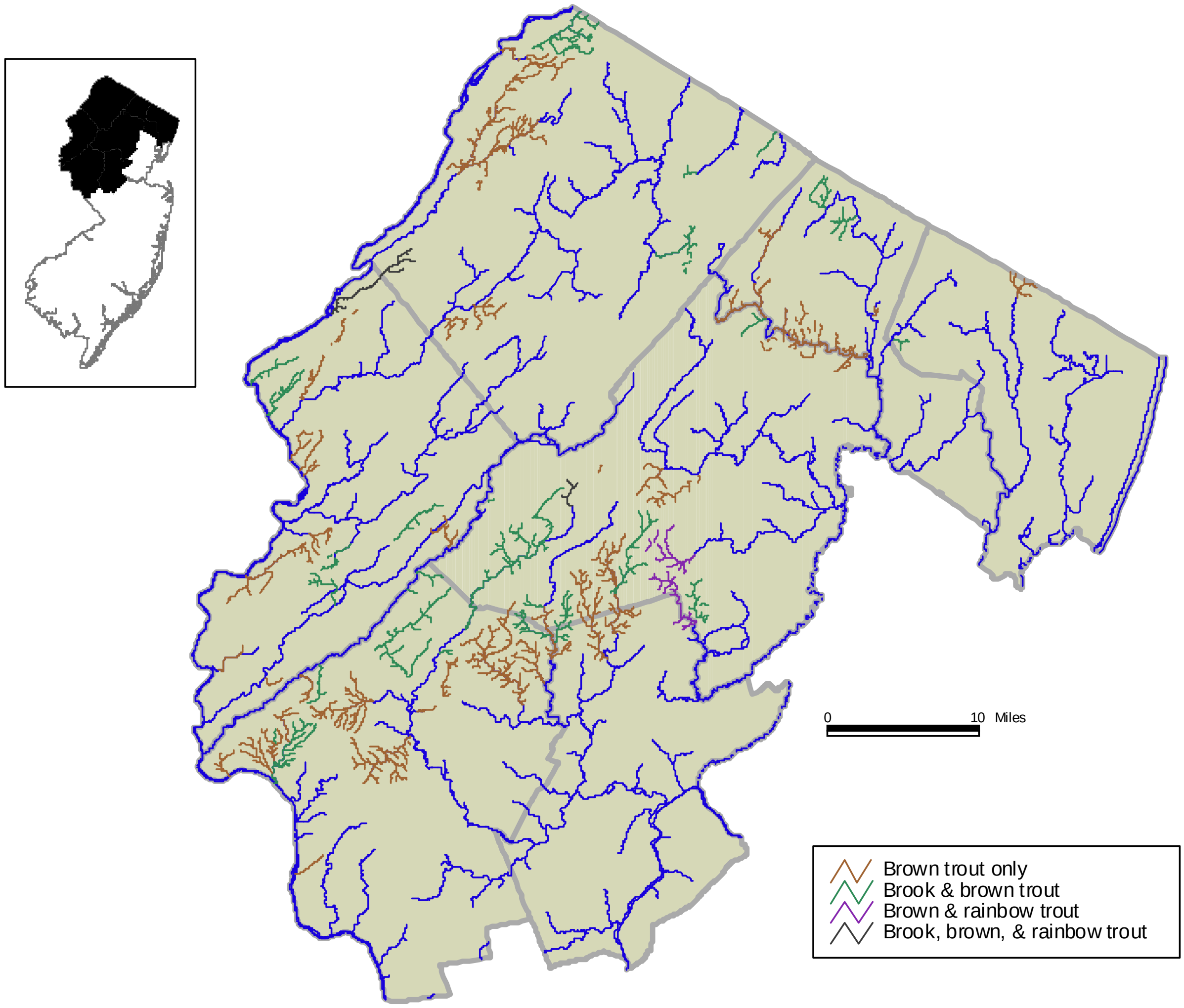


FIGURE 7.— Distribution of wild brown trout in New Jersey as documented through DFW surveys conducted from 1968 through 2003.

Rainbow Trout (*Oncorhynchus mykiss*)

Rainbow trout, native to western North America, were first introduced to New Jersey in 1882. Despite widespread stocking over the last century, rainbow trout are the least common of the three stream dwelling salmonids in New Jersey. Reproducing populations have been documented in only thirteen streams in north Jersey and five of these are inhabited solely by rainbow trout (Figure 8). Of the remaining seven streams, four are co-inhabited by brown trout, one by brook trout, and three streams have reproducing populations of all three species. The reason behind the paucity of wild rainbow trout streams is unknown although it is suspected that physical habitat and stream gradient influence their distribution. Wild rainbow trout do not grow very large, with 8 - 12 inches considered a large fish.

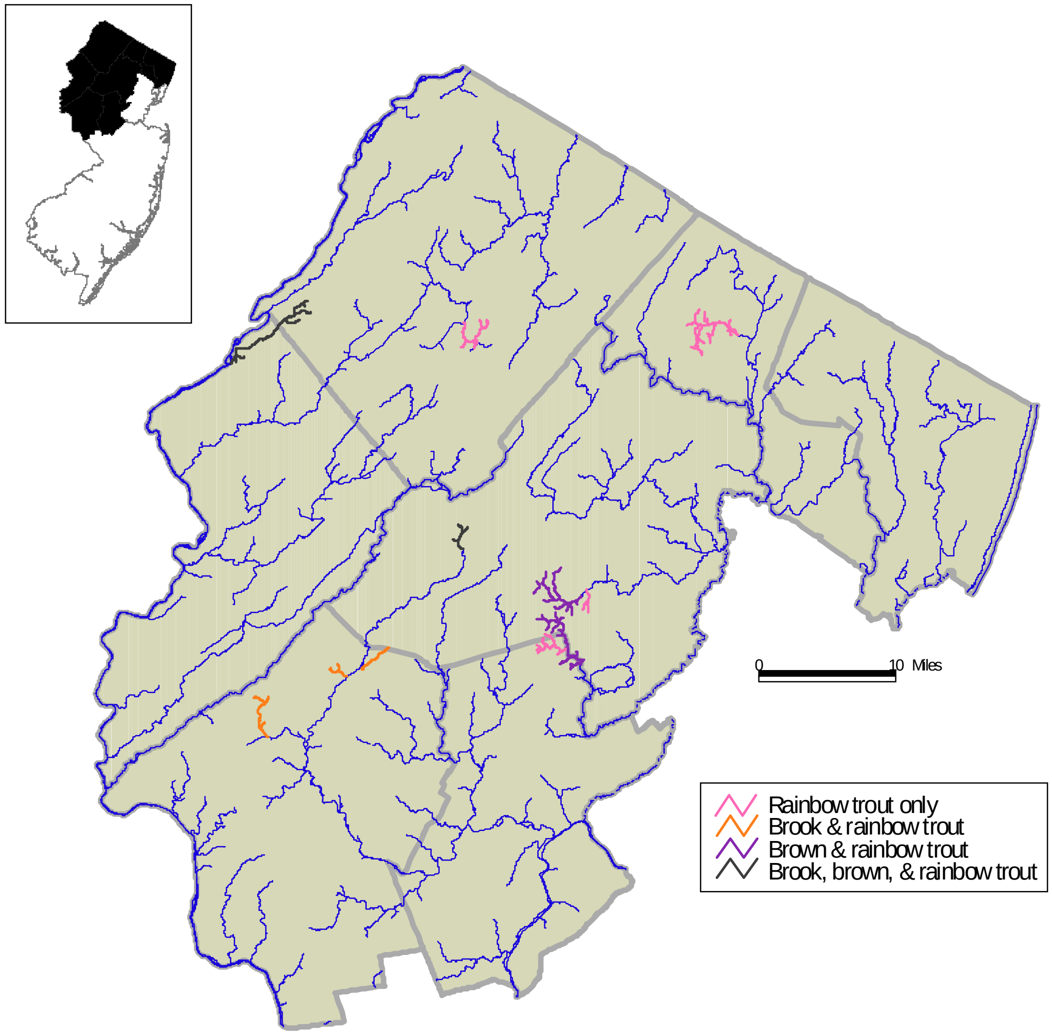


FIGURE 8.— Distribution of wild rainbow trout in New Jersey as documented through DFW surveys conducted from 1968 through 2003.

Lake Trout (*Salvelinus namaycush*)

Native to more northerly North American latitudes, the lake trout is a relative newcomer to New Jersey waters. In 1977 this species was introduced into Round Valley Reservoir (Figure 9), a large, deep-water reservoir (2,350 surface acres, 160 feet deep) that has ample salmonid habitat, particularly during the summer when most other New Jersey lakes lack a suitable strata of cold, well-oxygenated water. Lake trout were stocked to provide anglers with a local opportunity to fish for a long-lived salmonid having the ability to grow to a very large size. It was expected that as the population matured, adult lake trout would attempt to spawn over the large boulders lining the face of the dams and saddle dikes. In the mid-1980's successful reproduction was first documented. Supplemental stocking of hatchery-produced fingerlings continued until the when it was determined that natural reproduction was sufficient to maintain a desirable fishery. The opportunity to angle for trophy salmonids (brown, rainbow, and lake) has made this reservoir a popular fishing destination. Lake trout have also been stocked annually into Merrill Creek Reservoir (650 surface acres, 210 feet deep) since 1988. Although similar spawning habitat is available for lake trout in this reservoir, successful reproduction has not been documented.

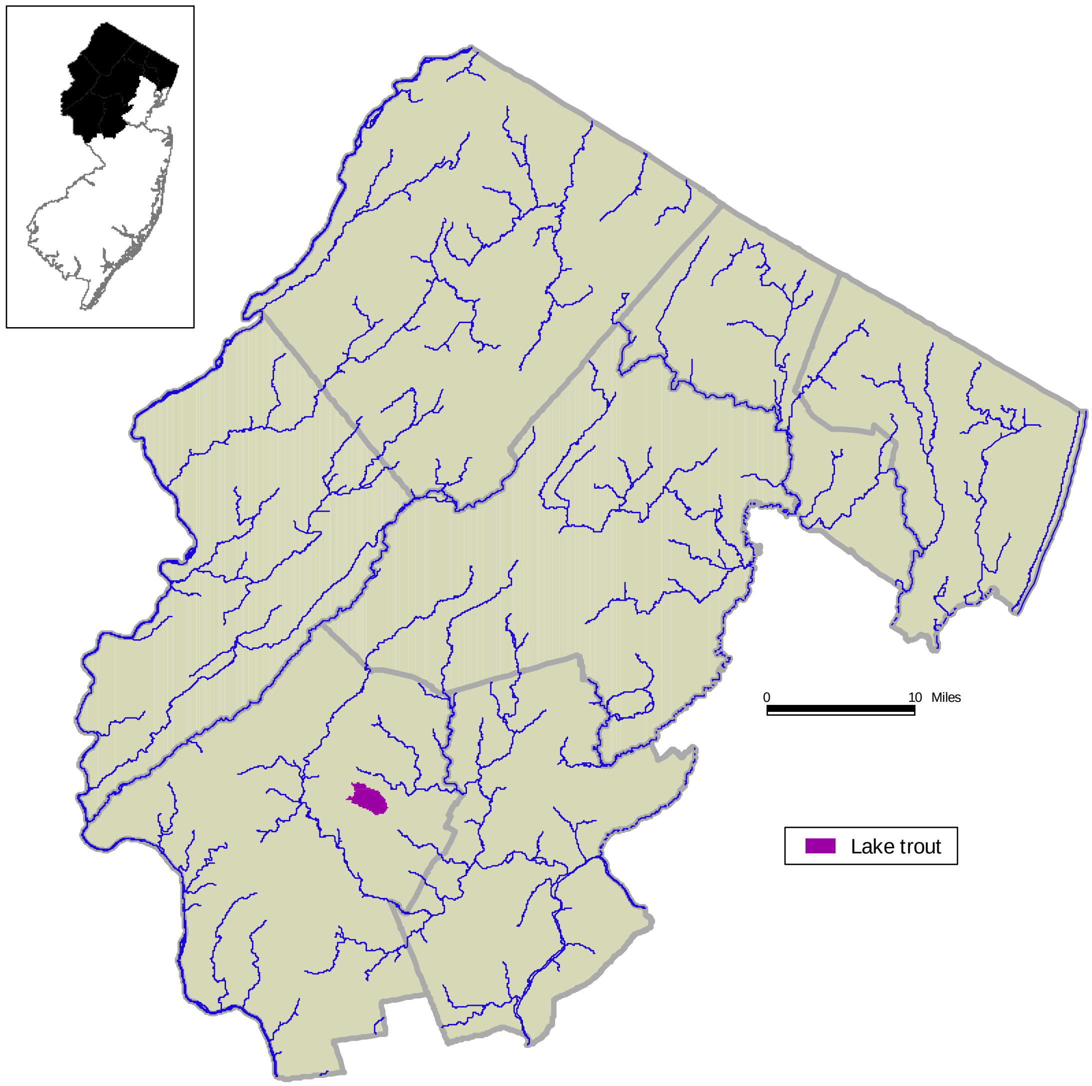


FIGURE 9.— Distribution of wild lake trout in New Jersey as documented through DFW surveys conducted from 1968 through 2003.

Management Strategies for Wild Trout

Bureau of Freshwater Fisheries activities, which guide the DFW's efforts in managing the state's wild trout, can be categorized into four strategies: resource inventory, research and monitoring, regulations and habitat preservation, protection and restoration.

Resource Inventory

The first step in managing New Jersey's wild trout populations is to have and maintain an inventory of wild trout populations (and their aquatic habitats) so that species distributions can be mapped. Presented in this plan, for the first time, are the species distribution maps for New Jersey's four reproducing salmonid species. Survey data collected by the DFW over a 36-year period was used to prepare these distribution maps. This information is in a format that can be interfaced with other GIS information layers and used by resource managers to assist in the development of strategies for managing these valuable fish communities and their habitat as a unit.

Current inventory activities include:

> Classification of NJ Trout Waters (Job II-2 under Federal Grant F-48-R)
> Surveys are conducted in the summer to determine the trout supporting status of waters not previously surveyed or classified waters that may qualify for a higher classification. Recommendations for classification changes are forwarded to NJDEP for consideration in the Surface Water Quality Standards.

Research and Monitoring

Monitoring provides information needed to evaluate management success and provides a scientific basis for modifying management practices. It involves the collection of information through programs, investigations, and evaluations. Examples of monitoring activities are documenting new populations and determining population trends, changes in species distributions, changes in habitat, and angler preferences and exploitation (fishing). Information gathered can then be evaluated and used to guide management decisions.

Current research and monitoring activities include:

> Re-Inventory of Trout production Waters (Job II-2 under Federal Grant F-48-R) Seventy-five trout production streams surveyed between 1968 and 1973 are being resurveyed to document changes in fish community structure as related to changing land use.
>
> Opportunity - Prioritize and establish a monitoring schedule for wild trout populations.
>
> Brook Trout Genetics Study
> Widespread hatchery supplementation and translocations, by well-intentioned managers and anglers may have resulted in displacement of ancestral

(heritage) brook trout from their native streams or interbreeding with cultured, non-native brook trout strains. The origin of brook trout inhabiting New Jersey waters is under investigation using molecular genetics technology. If populations that have been unaffected by past management practices can be identified then genetic conservation of these "heritage" populations can be integrated into management strategies.

Lake Trout Population Monitoring
The lake trout populations in Round Valley Reservoir and Merrill Creek Reservoir are monitored each fall using gill nets to assess fish condition and natural reproduction. The information collected is used to determine if new regulatory or management strategies are warranted.

Fishing Regulations
Regulations provide protection to wild trout populations by managing the size, number and time frame for which trout may be taken. Presently, wild trout populations are afforded protection under two specific regulations; the Wild Trout Stream regulation and general statewide regulations. Established in 1990, there are currently 35 streams (or portions thereof), encompassing 135 miles of stream, that are designated and regulated as *Wild Trout Streams*. This figure represents 20 percent of the streams that have been identified as having reproducing trout populations. Selection was loosely based upon a stream's ability to support a quality fishery for wild trout and geographic distribution since increasing public awareness and recognition of these waters was considered important. A number of the streams selected had been traditionally stocked with cultured trout and this practice was discontinued. Fishing is permitted from opening day of each year to September 15, with a minimum size limit of 7 inches and a limit of two fish per day. The streams are catch and release only the remaining part of the year providing protection during their critical spawning period. Only artificial lures may be used.

The general statewide regulations afford a 7-inch minimum on all trout caught within the state. This minimum size limit was incorporated into the statewide general regulations in 1997 to protect wild trout populations in streams not designated under the *Wild Trout Stream* regulation or other special regulations. However, no protection is provided during the spawning period and the daily creel is 6 fish per day from opening day through May 31 and 4 fish the remainder of the year, with the exception of the pre-season stocking closure when no fishing is permitted.
A small number of trout production waters, or stretches there of, are afforded protection through special regulations. Further elaboration on these and other fishing regulations, as well as their development over the years, can be found in the Fishing Regulations section of this plan.

Opportunity - Approximately 140 trout production streams are not trout-stocked or regulated as a *Wild Trout Stream*. The harvest of these wild trout is currently governed by the statewide general regulation. The need to have more stringent regulations governing the harvest of wild trout in these trout production streams should be explored.

Opportunity - Evaluate trout production streams currently regulated as *Wild Trout Streams*, *Trout Conservation Areas*, and *Fly Fishing Only Areas* to determine if existing fishing regulations provide for appropriate level of recreation that is consistent with maintaining viable wild trout populations.

Habitat Preservation, Protection and Restoration

Land use changes and issues are considered key factors that influence and impact water quality and fish communities in New Jersey's freshwaters. Land use activities that increase summer water temperatures, increased sediment transport and deposition, and cause in-stream flow extremes are considered to be the greatest threats to wild trout habitat. Habitat preservation and protection, and efforts to minimize impacts from land use disturbances are essential to maintaining self-sustaining wild trout populations. It is more effective to preserve habitat than to restore it after it has been damaged. Watershed based management, which treats fish communities and their habitat as a unit, aids in prevention of habitat destruction and fragmentation that can lead to species declines and shifts in species composition.

Opportunity - Prioritize trout production streams for the purpose of acquisition and/or easements provide to the NJDEP Green Acres Program.

Opportunity - Identify habitats and ecosystem types that support wild trout and are in danger of being lost or drastically altered. Explore ways to protect landscapes in which wild trout occur through links with management initiatives for other biotic resources (plants, birds, herptiles, etc.).

Opportunity - Evaluate the necessity and desirability of continued stocking of cultured salmonids on trout production streams currently trout-stocked by DFW.

Opportunity - Determine if there are linkages between wild trout populations and topographic characteristics (gradient and elevation), soils, land-use, physicochemical characteristics, and other features to develop a tool for identifying potential or historical wild trout habitat.

Opportunity - Identify land-use changes that have affected wild trout and aspects within watersheds that if improved or modified would restore or sustain healthy wild trout populations

Education and Communication

Another component of successful wild trout management is involvement of stakeholder groups. These groups may include, but are not limited to fishing clubs, conservation organizations, watershed associations, recreational clubs, local environmental commissions, etc. Although at times these groups may have conflicting interests, they can be a strong ally and advocate in conservation of the ecosystems in which wild trout reside. It is also important to recognize the interests of the large majority of individual anglers, which do not belong to organized groups, who are impacted by management decisions.

Opportunity - Organizations and individuals often lack the resources needed to effectively combat land development projects in their communities that may negatively affect wild trout resources and turn to DFW for assistance. DFW provides technical information upon request but could become more proactive by preparing fact sheets, and providing current fisheries information so that potential impacts to wild trout resources can be addressed.

Opportunity - Develop a program that involves land owners, local communities and school systems in stewardship activities that promotes awareness of the value of wild trout and their ecosystems and encourages stewardship.

Opportunity - Educate the public on the value of wild trout through informational materials (e.g. a brochure on the state fish, video on stream restoration) and the DFW website.

Wild Trout Management Policy

Wild trout are valued as indicators of healthy aquatic ecosystems and help provide New Jersey trout anglers with a diversity of angling opportunities. DFW actively manages wild trout populations and their ecosystems through actions designed to conserve and protect this valuable resource for enjoyment by all citizens. Brook trout, New Jersey's state fish and only native salmonid species, is considered a species of special concern that will be perpetuated and maintained. The policy for wild trout management shall include, but is not limited to the following:

1. Habitat protection and restoration will be the principal long-term management strategy for trout production streams.

2. Wild, self-sustaining trout fisheries will be promoted and emphasized as the preferred and most efficient management strategy management for trout.

3. Designated *Wild Trout Streams* will have wild trout populations sufficient in magnitude to provide a satisfactory angling experience and appropriate angling regulations that will maintain trout populations at desirable levels.

4. The stocking of non-native or cultured fish species (including salmonids) has the potential for negatively affecting wild trout populations. DFW will adhere to the following guidelines when reviewing stocking requests or applications for streams having self-sustaining trout populations:
   a) Streams designated as *Wild Trout Streams* will not be stocked with cultured trout.
   b) Streams having self-sustaining trout populations that are not designated as a *Wild Trout Streams*, and have not been stocked with cultured trout since 2000, may not be stocked with cultured trout.

c) Streams having self-sustaining trout populations that are not designated as a *Wild Trout Streams*, and have been stocked with cultured trout since 2000 will be evaluated on a case by case basis. The ability of the existing wild population to sustaining a desirable fishery will be a prime consideration. If stocking is allowed then DFW stocking guidelines regarding species selection will be followed.

5. Establishment or re-establishment of wild trout populations in waters having suitable habitat will be achieved using genetically suitable stock and brook trout will be the preferred species. In the absence of conservation genetic guidelines, translocations using wild stock may be considered provided established fish health policies are followed.

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Culture of Salmonids

Overview

The stocking of New Jersey waters with trout spans well across an entire century. The stocking program, fish culture technology and attitudes have changed considerably during this time frame. Initially viewed as only serving the wealthy, the stocking of trout was not supported by the New Jersey Fish and Game Commission. The first stocking of brook trout by the Commission in 1879 was only in response to a severe drought and was intended to replenish native populations which were believed to be decimated. The idea caught on however and more focused efforts were made for expanding recreational opportunities across the state.

The first stocking records date back to 1879. The mode of transport was by train, using milk cans. Upon arrival trout were transferred to wagons which transported the fish to streams. Fish were initially purchased under contract from private hatcheries. In 1912, the State began construction of its own hatchery in Hackettstown and began producing fingerlings. Production of catchable size brook, brown and rainbow trout began in 1914. By 1932, the Hackettstown hatchery was raising over 500,000 trout for distribution across the state. The transport of fish was now done by truck but milk cans still served as holding areas. In the years that followed disease outbreaks among the hatchery stock due to the intensive culture increased, as did the demand for other warmwater species. In 1980, the construction of the Pequest Trout Hatchery began and the production of all trout, with the exception of lake trout, was transferred there when the facility opened in 1983.

Presently, the DFW owns and operates two state-of-the-art- facilities, the Pequest Trout Hatchery and the Hackettstown Hatchery. Together, they meet the State's demand for coldwater and warmwater fish species. The Pequest Trout Hatchery raises over 770,000 catchable trout annually and distributes them using a fleet of tank trucks equipped with on board aeration systems. The fish are distributed to 180 lakes and streams during which over 1,000 stocking points are visited. The Hackettstown hatchery raises over 2 million fish representing16 warmwater/coolwater species. Currently, lake trout is the only salmonid raised at the Hackettstown facility.

Pequest Trout Hatchery

<u>Facility Description</u>

The Pequest Trout Hatchery is located in the Pequest River valley near the town of Oxford, in Warren County. The hatchery encompasses approximately fifty acres within a four thousand-acre wildlife management area. There are sixty-four concrete raceways, ten feet wide by one hundred feet long. A stable, cold water supply is a critical factor in trout propagation and maintenance of a production cycle. Seven on-site artesian wells supply the hatchery with up to seven thousand gallons of water per minute. This groundwater supply has a constant temperature of 11°C (52°F) year round and is capable of maintaining a continuous flow of water through the hatchery system. Flow from each of the operating wells is monitored closely and controlled remotely through phone lines. Consistent and reliable operation of the wells requires an intensive maintenance schedule.

Opportunity – Phone lines currently used to monitor and operate wells are aging and may not be reliable in the future. The purchase of a broad spectrum radio well communication system should be investigated to replace existing communication system.

The groundwater is aerated and then by gravitational flow cascades through the raceway system eventually discharging into the Pequest River. Due to the sensitivity of an intensive rearing facility and that water flow can not be interrupted, an emergency back up system was installed when the facility was constructed. Three of the wells have their own direct drive diesel motor that activates any time the power is interrupted for any reason. A fourth diesel generator, which operates two additional wells and emergency lighting, is located in the basement of the nursery building. A contracted alarm company monitors emergency situations and notifies personnel along with on site sirens.

The intensive rearing of fish produces a considerable amount of waste products. To address both fish and domestic waste, the Pequest facility houses its own sewage treatment plant. A separate clarifier de-waters the trout waste into sludge. The trout sludge is land applied on the Pequest Wildlife Management Area in a joint venture with the local farmers and Soil Conservation Service. The application of sludge is monitored under the facility's NJPDES permit (NJ0033189) with required annual testing of heavy metals and priority pollutants. The domestic side of the plant is completely separate from the trout waste and is tested for toxic organics, metals, and other chemical parameters. Two active discharge permits are required for the operation of the Pequest complex. The first is surface water discharge (OO1) which covers the flows through the raceways and discharge into the Pequest. The permit requires monthly, quarterly, or semiannual monitoring for flow, BOD, PH, Total Suspended Solids, Nitrogen Ammonia, Fecal Coliform, Chlorine Produced Oxidants, Temperature, Dissolved Oxygen, and Total Phosphorus. The second active permit is for ground water (JO1). Parameters tested throughout the year are: Flow, PH, Nitrogen Ammonia, Nitrate Nitrogen, Kjeldahl Nitrogen, Total Dissolved Solids, and Chlorine. This is the flow that runs through the domestic package plant and is combined with the total discharge. A treatment plant operator, with a minimum of an S-4 license, is required to oversee the operation of the plant. Other regulatory agencies involved in the operation of the hatchery are: Bureau of Water Allocation for water supply permit, quarterly diversion reports and potable water testing; Bureau of Applicability and Compliance monitors fuel storage tanks; Bureau of Pretreatment and Residuals oversees trout sludge and land application; NJ Department of Community Affairs covers fire safety and inspections; the Warren County Health Department; NJ Department of Health oversee Right To Know procedures; US Fish and Wildlife Service issues a Federal Fish and Wildlife Depredation Permit. In addition, DFW's Lab Services, Purchase Bureau, Human Resources, and the US Geological Survey are directly involved in the operation of the Pequest facility.

History of Trout Culture

Production of trout commenced in the fall of 1982, when the construction of the facility was completed, with the arrival of 560,000 disease-free rainbow trout eggs from the federal hatchery at White Sulphur Springs, West Virginia. An additional 680,000 brook trout and 610,000 brown trout eggs were obtained from the North Attleboro National Fish Hatchery in Massachusetts. In the spring of 1984, following the hatching of these eggs and a 17-month growing period, the first trout reared at Pequest were released in New Jersey lakes and streams. Trout from the first egg hatch were also reared to maturity and retained as broodstock to provide an internal source of eggs and sperm for the production of future generations of disease-free trout. The hatchery maintains a quality broodstock population of trout through an annual selection process.

Culture Techniques

Annual production goals are satisfied by harvesting approximately 650,000 eggs from both brook and rainbow trout broodstock and 400,000 eggs from brown trout broodstock. The production cycle begins in early fall when eggs from the broodstock trout are collected and fertilized. This process, known as "stripping," is performed by manually applying pressure to the trout's abdomen, forcing females to expel ripe eggs and males to expel milt (the fluid containing sperm). The eggs and milt are mixed together in plastic basins to achieve fertilization. Fertilized eggs are then placed in incubators in the nursery building where running water, held at a constant temperature of 11°C (52°F), supplies them with dissolved oxygen until hatching occurs. Trout eggs incubated at this temperature hatch in about 30 - 35 days.

The overall hatch rate for all three species averages 65 percent. Upon hatching, the young trout are called "sac-fry" because the yolk sac, which nourishes the fry, remains attached to the trout's abdomen. The sac-fry are removed from the incubators and placed in fiberglass holding tanks in the main portion of the nursery building. The yolk sac is gradually absorbed by the sac-fry over a two-week period. When this internal food supply has been exhausted the trout are termed "fry" and begin to swim freely and feed upon an external food supply. Automatic feeders suspended over the nursery tanks feed the fry a commercially prepared, high-protein diet eight times daily.

After the winter and early spring growing cycle, which has an 85-95 percent survival rate, the trout average three to four inches and are called fingerlings. The fingerlings are sorted by size and their numbers are reduced to allow the remaining production fish more room to grow. The smaller, surplus fingerlings are either stocked or used in inter-state bartering programs. The production fingerlings are then moved to a series of outdoor raceways that have been divided into "pools." Each pool is set up with 13,500 fish, with 19 pools each of brook and rainbow trout and ten pools of brown trout. In 2003, in response to angler requests, brown trout production was increased by 25,000 modifying pool set up to 19 pools of brook, 17 pools of rainbow and 12 pools of brown trout. Since the hatchery already operates at full capacity, rainbow trout production was reduced as a result of this change.

Pequest Trout Hatchery Production Targets

Species	Prior 2003*	2003*
Brook	237,500	250,000
Brown	125,000	150,000
Rainbows	237,500	200,000

*Numbers are approximate targets for species composition. Actual production numbers vary each year, and are dependent on a variety of factors.

After the summer growing period, the fish are again sorted for size, and the larger fish are retained and used to re-set the raceways with a density of 12,500 fish per pool. Approximately 600,000 trout are set to ensure that the spring baseline trout quota of 575,000 trout, averaging 10.5 inches in length, will be achieved. Surplus fish resulting from this sort (approximately 48,000 fish, averaging 5.8 inches) are held and stocked during the third week of the fall trout-stocking program. The production fish are then fed four times daily. Inventories are conducted and feed totals are calculated monthly and used to adjust trout growth rates.

By mid March the production trout are nearly 1½ years old and weigh ½ pound apiece. Over the next ten weeks these fish are loaded onto trucks and stocked statewide under the spring trout-stocking program. During the three weeks of pre-season stocking, the excess and spent broodstock are also liberated along with the production stock until their supply is exhausted. Once these catchable-size trout are shipped, fingerlings that hatched from eggs collected the previous fall are quickly moved from the nursery into the raceways.

After several years of operation and success in meeting production goals for the spring program, it was determined that production could be expanded for new programs. A small number of raceway pools, underutilized in the late summer and early fall, were put into production to provide trout for the fall, winter, and sea-run trout programs. Increased water flows and feeding rates were used to accelerate the growth of yearling fish kept in these pools. The fall program consists of about 45,000 yearling rainbow trout, averaging ten inches, which are available for stocking in October. The winter program consists of 12,000 rainbow trout, averaging 11 inches, which are available for stocking by late November.

Implementation of the DFW's 2005 trout proposal (See Appendix A) will result in substantial changes to the 2006 fall and winter trout programs. In the fall of 2006 the 45,000 yearling rainbow trout, traditionally reared will be replaced with 20,000 two-year-old fish representing all three species and ranging in size from 14” to 16”. A similar change for the 2006 winter program will result in 5,000 two-year-old rainbows being distributed. These changes are anticipated to increase angler interest and participation in fall and winter trout fishing.

Opportunity: Investigate the feasibility of decreasing numbers of trout stocked to increase overall size of trout stocked.

Thirty thousand surplus brown trout from the spring yearling sort are reared to eight inches for the sea-run program for stocking in late October. In the future this number may be decreased to improve hatchery operations.

Opportunity: Investigate the feasibility of reducing brown trout allocated for the sea run program to improve hatchery operations.

Charles O. Hayford Hatchery (Hackettstown)

Facility Description

The Hatchery is located in the Musconetcong River watershed in Hackettstown, Warren County. The Hackettstown Hatchery is one of the oldest fish hatcheries in the country dating back to 1912. For over 70 years it was the only state-run hatchery in New Jersey. In 1983, the production of brook, brown and rainbow trout shifted to the newly constructed Pequest Trout Hatchery. The hatchery at Hackettstown retained the production of lake trout because the lake trout eggs are obtained from outside sources that are not certified disease-free.

The water source at the Hackettstown Hatchery is gravity flowed spring water. These springs provide about 1300 gallons per minute flow and maintain a temperature of 11°C. Following renovations in 2000, this same spring water is now pumped up into a head tank and then gravity flows through the rearing tanks. During the pumping process the water is sent through an ultraviolet sterilizer and a degassing column and is also oxygenated.

History of Lake Trout Culture

New Jersey’s lake trout program began in 1976 with the arrival of 31,000 eyed lake trout eggs from the Marquette State Fish Hatchery in Michigan. In March, 1977 the first stocking of lake trout in New Jersey took place at Round Valley Reservoir, Hunterdon County. This initial stocking totaled 7,330 lakers that averaged 5.6”. Eggs were annually obtained from Michigan DNR through 1981, when hatchery renovations in Michigan eliminated this egg source. In 1981, New Jersey fisheries biologists spawned 2,500 eggs from broodstock collected in Round Valley Reservoir. From 1981-1988, eyed eggs were obtained from the U.S. Fish and Wildlife Service through the Jackson National Fish Hatchery in Jackson Hole, Wyoming. These Wyoming lake trout were the Jenny Lake strain. In 1988 a lake trout program was initiated at Merrill Creek Reservoir.

From 1988-1991, staff from the Lebanon lab and the Hackettstown hatchery collected over 175,000 eggs from Round Valley Reservoir broodfish. Hatching results from these eggs ranged from 20% to 47%. These hatching rates were low compared to the 95% rates of the Michigan and Wyoming eggs. Possible reasons for low hatching success were broodstock age, spawning techniques, and diet of the wild broodfish. Wyoming's broodstock were six years old, whereas the age of broodstock captured from Round Valley Reservoir was variable. Wyoming used a captive broodstock at the hatchery and spawns these fish under controlled conditions. The Round Valley Reservoir broodstock were captured in large mesh gill nets and spawned on site, immediately following capture. Studies have shown that a fish diet, particularly a diet of alewives, can affect the hatching and swim-up success of each lot of fry.

Because the collection of broodstock from Round Valley Reservoir was labor intensive and the hatch rates were poor, it was deemed more cost effective to obtain eyed eggs from other sources. Since 1991, the hatchery at Hackettstown receives about 10,000 eyed eggs from the Story State Fish Hatchery in Story, Wyoming.

Lake Trout Culture Techniques

In early October, the Story Hatchery in Wyoming obtains lake trout eggs from broodfish. By mid-December, after a 52 day incubation period (at water temperatures approaching 5ºC), the eggs reach the eyed stage. At this stage in egg development they can be handled and are sent overnight express to the Hackettstown Hatchery. During shipping the eggs are packed in a cooler with a layer of ice over top of them to keep them cool and moist. They arrive at about 5ºC and are gradually warmed to 11ºC by dripping water over them for a couple of hours. Next they are placed in tray style incubators where they remain for an additional fourteen days until hatch occurs.

Hatching usually takes place over a two to three day period and then the eggs are placed on trays in a long, narrow trough. Over the next two weeks the sac fry feed off the nutrients contained in the sac they were born with. Toward the end of the two week period they become very active and begin to swim freely in the water column. This period is referred to as swim-up and they are fed a commercially prepared, high protein, high fat, pelleted feed. They grow approximately 0.75 inches per month and are periodically moved to larger tanks. They are trained to feed in a 100-gallon trough for the first thirty days. Once trained, they are moved to a 350 gallon circular tank where they grow to about two inches. Next they are transferred to a 1000 gallon rectangular tank where they will grow to four inches. Finally they finish their growth to seven and a half inches in a 2000 gallon tank. All of this time is spent indoors; however, prior to 2000 much of their growing time was spent outdoors in covered concrete raceways. Under these outside conditions the fingerlings endured predation (birds, mink, and otter) and other natural problems such as heavy snows, and flow problems (due to leaf-clogged screens).

Prior to stocking, the lakers are enumerated by weight, and fin clipped to mark the year class. Each year a different fin is clipped (five year rotation, using adipose, pectoral, and pelvic fins) to assist biologists in assessing and managing established populations. All of the lake trout stocked in Round and Merrill Creek Reservoir Valley (with the exception of the first year class) have been fin clipped. Stocking generally takes place the beginning of November when the reservoir surface water temperature drops and approaches the water temperature in the hatchery 11°C.

Throughout the period between 1976 and present, all lake trout eggs brought into the Hackettstown Hatchery have been from specific-pathogen-free stocks of Federal and State Hatcheries. The most serious fish health problem diagnosed in lake trout at the Hackettstown Hatchery was furunculosis, caused by the bacteria *Aeromonas salminicida*. Between 1976 and 1982, when the Hackettstown Hatchery functioned primarily as a trout hatchery, severe outbreaks of furunculosis occurred among lake trout reared from specific-pathogen-free eggs, and mortality rates often exceeded 50% of the stock. The disease has not been diagnosed in lake trout at the Hackettstown Hatchery since 1983 when production of other species of trout at Hackettstown was discontinued, indicating that other species of trout reared at Hackettstown served as carriers of the infection. Fish health inspections of lake trout reared at the Hackettstown Hatchery, conducted annually since 1989, have failed to detect carriers of *Aeromonas salmonicida* or of any other of the major salmonid pathogens.

The only other significant health problem in Hackettstown Hatchery lake trout was encountered in sac fry. Between 1986 and 1991, lake trout eggs were collected annually from adults in Round Valley Reservoir and used to supplement production from outside sources. Early life stage mortalities were experienced throughout that period in progeny of Round Valley Reservoir lake trout (RVR fry), but not in fish obtained as eggs from federal hatcheries (NFH fry). Survival of RVR fry between hatch and swim-up was 40% or less in five of the six years from 1986 to 1991. RVR sac fry were less active than NFH fry, had pale colored yolk sacs, and in some years suffered from blue sac and coagulated yolk. In 1992, collection of eggs from RVR brood fish was discontinued due to the relatively high mortality rates in the early life stages. A study into the possible role of thiamine deficiency in the mortalities was conducted during 1996 and 1997 was inconclusive. While thiamine levels in RVR eggs and fry (1.4 - 10.0 nmoles/g) were considerably lower than in NFH fry (19.6 nmoles/g), the levels were not below threshold levels that have been reported for thiamine deficiency (0/9 nmoles/g).

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Fish Health Management for Salmonids

Overview

Although diseases and parasites of wild trout in New Jersey have not been widely studied, there is currently no evidence suggesting that pathogens threaten the long-term viability of these fish populations. However, diseases and parasites have been encountered throughout the history of public fish culture in New Jersey and have been problematic at times within the confines of the hatchery facilities. The DFW's Hackettstown Hatchery, continuously operated since 1913, experienced a variety of pathogen-related problems including some which are considered to be major obligate pathogens of salmonids (furunculosis, whirling disease, bacterial kidney disease, and infectious pancreatic necrosis).

In the early 1980's all of the salmonid production except lake trout shifted to the newly constructed Pequest Trout Hatchery, and pathogen-related problems at Hackettstown Hatchery subsided. Salmonid eggs from certified disease-free sources were used to commence production at the Pequest Trout Hatchery. Since 1985, when the initial egg stocks matured as broodstock, no additional eggs or fish from outside sources have been introduced into the Pequest Trout Hatchery. Outbreaks of bacterial gill disease and coagulated yolk disease have occurred at this hatchery, however mortality has never exceeded 1 % of hatchery production. With the exception of two years, losses with coagulated yolk disease for the most part have been insignificant.

Procedures and policies have been developed to prevent or minimize the introduction and transfer of pathogens within the DFW's fish culture operations and in wild fish populations. Measures taken at the Pequest Trout Hatchery include restriction of visitors to peripheral areas of the facility, exclusion of outside equipment and vehicles from the nursery and raceway area, and disinfecting of any essential equipment which must be brought in from other areas.

Pequest Trout Hatchery

The Pequest Hatchery began operation in 1982 and achieved full production by 1984. Major emphasis was placed on starting and maintaining the Pequest Hatchery as a specific-pathogen-free facility in order to avoid the economic loss and unreliable production cycles that were experienced at the Hackettstown Hatchery due to fish diseases. This is accomplished by following the developed hatchery access guidelines (Appendix E) and fish health policies.

Original stocks of trout for the Pequest Hatchery were obtained from USFWS facilities that had been inspected and certified free of the major salmonid pathogens. All fish were obtained as eggs that were disinfected with iodophor before being placed in Pequest Hatchery incubators. From 1982 through 1984, rainbow trout eggs were obtained annually from the White Sulfur Springs NFH in West Virginia. In 1982 and 1983, brook and brown trout eggs were procured from the North Attleboro NFH in Massachusetts; however, because of the diagnosis of furunculosis at that facility in 1984, eggs were not obtained from North Attleboro NFH after 1983. In 1984, Owhi strain brook trout eggs were obtained from the White Sulfur Springs NFH; however, brook trout egg production at Pequest was begun that year and fish from that strain were not incorporated into the Pequest Hatchery brood stock. Due to the unavailability of certified stocks, no brown trout eggs were obtained from other hatcheries in 1984.

Egg production from Pequest Hatchery brood stocks of all three species was accomplished in 1985, and no eggs or fish from outside sources have been brought into the Pequest Hatchery since that time.

Currently, the only disease problems, which have been associated with significant mortalities of trout at the Pequest Hatchery, are bacterial gill disease and coagulated yolk disease.

Bacterial gill disease

Bacterial gill disease is caused by common waterborne *Flavobacteria*, which infect gill tissue and cause disease under conditions associated with intensive rearing. It is not known to occur in wild fish. Mortalities among Pequest Hatchery stocks have been controlled by chemotherapy and by alteration of environmental conditions (improved sanitation and increased water flow). Mortalities due to bacterial gill disease have never exceeded 1% of production in any given year, and its impact on the trout-rearing program at the Pequest Hatchery has been minimal.

Chloramine-T offers the most effective and efficient treatment for bacterial gill disease. Treatment is performed by making an aqueous solution of Chloramine-T and dripping it into raceways or tanks to achieve a 10-20 ppm concentration for one hour. The drug is used experimentally and substantial documentation requirements are associated with its use. The Food and Drug Administration disallowed its use from 2001 to 2003 awaiting additional information from the manufacturer. In July of 2003 it was once again approved for experimental use. The use of chloramine–T, however, raised issues with meeting NJPDES permitting requirements for chlorine oxidant discharge. As of August 2003 its use at the hatchery was discontinued until measures could be taken to dechlorinate the hatchery effluent following Chloramine-T treatments. A portable dechlorination system was developed and tested for use at the hatchery in October of 2003. The dechlorination of the hatchery effluent, during treatments, keeps the chlorine oxidant discharge within established NJPDES guidelines.

A less problematic but also less effective treatment for bacterial gill disease is sodium chloride (salt). Treatment requires fish to be removed from the raceways and immersed in a bath solution of salt for 1-10 minutes in tanks or tubs. Even with repeat treatments control is limited. Salt baths require considerable labor but pose no discharge issues.

Coagulated yolk disease

Coagulated yolk disease is a poorly understood syndrome affecting eggs and fry. The cause of the disease has not been clearly defined and the disease may be caused by different factors or conditions in different hatcheries where it occurs. Although a chronic problem in brook trout at the Pequest Hatchery since 1984, losses have generally been insignificant in terms of their impact on hatchery production. An exception occurred in 1991 and 1992 when losses among swim-up fry exceeded 90%. Subsequent investigations have failed to identify the cause; however, alteration of egg incubation procedures has resulted in a greatly reduced incidence of coagulated yolk disease in the years since 1992.

Only two parasites, *Trichodina* and *Ichthyobodo*, have been identified from trout in the Pequest Hatchery. *Trichodina*, a ciliated protozoan, was occasionally found on the skin of yearling trout of all three species between 1990 and 1992. *Ichthyobodo*, a flagellated protozoan, infected fry and fingerlings in nursery building tanks from 1997 to 1999. Neither of these parasites was associated with significant mortalities and both appear to have been successfully eradicated from hatchery stocks through chemotherapy.

External parasites are typically controlled by formalin. However, treatment has only been used 2 or 3 times over the past 20 years for parasite control at Pequest. There is no withdrawal period, fish can be consumed immediately following treatment. When used for parasite control, Formalin is dripped into rearing water in raceways or tanks to achieve a 170 ppm concentration for one hour. Depending on the parasite involved, control is achieved in 1 to three treatments. Acetic acid has been used on several occasions for control of external parasites on trout. Treatment is administered by removing fish from the rearing tank and immersing them in an acetic acid solution for up to one minute. This treatment is labor-intensive and has generally been used only on small fish.

Formalin is also used as a fungicide on eggs. Formalin is FDA-approved for food fish use under the brand names Formalin-F, Paracide-F, and Parasite-S. Formalin is dripped into egg incubators to achieve a 1667 ppm concentration in the water for 15 minutes each day. Control is generally good, but fungus does colonize the eggs in spite of treatment. It is therefore used as a daily treatment throughout the incubation period. Formalin use is not labor intensive since entire raceways or incubators can be treated but treatments must be performed daily.

Oxytetracycline has been used on infrequent occasions at Pequest for control of systemic bacterial infections. It is FDA-approved for that use with a 21-day withdrawal period. Oxytetracycline is administered with the feed and can be purchased already incorporated into pellets directly from feed suppliers. Extra labor is involved in feeding fish on a medicated separately from other lots, but this has not been problematic. The medicated diet is fed daily for 10 days.

Romet 30 is also available for treating systemic bacterial infections in the same manner as oxytetracycline. It has never been used at our hatcheries, but is mentioned here because it is FDA approved and can be used if Oxytetracycline-resistant bacteria are encountered. Romet 30 carries a 42-day withdrawal period.

A suspected viral agent, described as a “Toga-like” virus, was found in brown trout during annual inspections conducted in 2000 and 2001. The suspect virus is not associated with any known disease and its significance to the health of Pequest Hatchery stocks is not known. It was not found in any of the lots of Pequest Hatchery trout, which have been inspected annually since 2002.

Hackettstown Hatchery

The Hackettstown Hatchery has been in continuous operation since 1913. Upon completion of the Pequest Hatchery, emphasis at the Hackettstown Hatchery was shifted from trout to warm and cool water fish. Brook, brown, and rainbow trout have not been reared at the Hackettstown Hatchery since 1983. Chinook salmon and steelhead trout were obtained in 1986 and 1987 from the New York DEC (Altmar SFH) for a short-lived experimental anadromous salmonid program. After these fish were released in the fall of 1987, no additional salmonids have been brought into the Hackettstown Hatchery from outside sources except lake trout and occasionally trout from the Pequest Trout Hatchery.

During the years when brook, brown, and rainbow trout were reared at the Hackettstown Hatchery, various diseases were diagnosed, including some which are considered to be major obligate pathogens of salmonids (furunculosis, whirling disease, bacterial kidney disease, and infectious pancreatic necrosis). Many of the diseases encountered at Hackettstown may have been brought into the facility by fish procured from outside sources (commercial hatcheries, federal hatcheries, other states' hatcheries, and wild populations). A complete description of the history of diseases and parasites, as well as, egg and brood stock sources for the Hackettstown hatchery can be found in the DFW’s Fish Health Plan (DFW 1991).

As stated previously, lake trout are currently the only salmonid species being reared at Hackettstown. Lake trout are raised primarily from eggs received from outside hatcheries, although eggs collected from wild brood stock at Round Valley Reservoir have been occasionally used. Lake trout eggs for the rearing program at Hackettstown were initially obtained from the Marquette, Michigan SFH (1976-1980) and later from the Jackson NFH (1981-1987), Ten Sleep, Wyoming SFH (1992), and the Story, Wyoming SFH (1993-2003). All eggs received from hatcheries outside of New Jersey have been from specific-pathogen-free stocks that were inspected for IPN (infectious pancreatic necrosis), VHS (viral hemorrhagic septicemia), and IHN (infectious hematopoietic necrosis) viruses, *Aeromonas salmonicida* (furunculosis), *Renibacterium salmoninarum* (bacterial kidney disease), *Yersinia ruckeri* (enteric redmouth), PKX (proliferative kidney disease), and *Myxobolus cerebralis* (whirling disease).

Historically (before 1982), furunculosis (*Aeromonas salmonicida*) was the biggest problem encountered in lake trout at the Hackettstown Hatchery. Occasionally, bacterial gill disease also caused some losses, but not often.

<u>Furunculosis</u>

Furunculosis, a skin infection caused by the bacterium *Aeromonas salmonicida*, was recognized in brown trout at the Hackettstown Hatchery as early as 1916. It became one of the most serious diseases encountered at Hackettstown and accounted for numerous mortalities over the years. Brook and brown trout suffered the most serious mortalities from furunculosis, while rainbow trout were seldom affected. Early control efforts involved moving affected fish to the coldest spring water available and avoiding contact with other lots of fish. Later therapies included medicated feeds using sulfonamide drugs (1946) and later an oxytetracycline antibiotic (Terramycin) was used. Severe outbreaks occurred during the 1970's among lake trout and brook trout that had been reared from eggs obtained from certified specific-pathogen-free hatcheries. Lake trout are raised in upper raceways directly fed from springs and never held in raceways fed by water that had passed over other species because of their extreme susceptibility to furunculosis.

Furunculosis has not been diagnosed in lake trout at the Hackettstown Hatchery since 1983 when production of other species of trout was discontinued. The absence of clinical cases of furunculosis may be in large part due to the low densities at which lake trout are reared. Fish health inspections of lake trout reared at the Hackettstown Hatchery, conducted annually since 1989, have failed to detect carriers of *A. salmonicida.*

Occasionally, external parasites such as Trichodina, Ichthyophthrius, and Gyrodactylus were found on lake trout at Hackettstown; however, since the lakers received the best water, these too were uncommon. In the years since trout production was shifted to Pequest, disease outbreaks have been rare among lakers at Hackettstown. One outbreak of bacterial gill disease occurred in July of 2001. The only other notable problems were early life stage mortalities manifested as blue-sac disease and coagulated yolk disease which were seen sporadically between 1986 and 1997. These always involved fry from Round Valley Reservoir egg takes. The possibility of the role of thiamine deficiency in early life stage mortalities was investigated, but no definitive conclusion could be reached. While thiamine levels in eggs and fry from Round Valley fry were much lower than levels in eggs and fry which we received from other hatcheries, they were not as low as levels generally associated with thiamine deficiency.

In addition to chemicals used for the treatment of specific diseases and parasites an anesthetic, Tricaine methanesulfonate, is used at both hatcheries. It is FDA-approved for that use with a 21-day withdrawal period under brand names Finquel and Tricaine-S. Carbon dioxide has been tried at Pequest, but was not considered a viable alternative to Tricaine. Concerns regarding adverse affects on fertilization rates when used on brood stock have been expressed, but do not seem to be a significant problem.

Fish Health of Wild Trout Populations

New Jersey's naturally reproducing trout populations are highly valued for sportfishing and are recognized as indicators of high water quality. Sampling from a large or unknown-sized population for pathogen detection requires the lethal sampling of at least 60 fish from each discreet population to detect a prevalence level of 5% with 95% confidence. Because individual wild trout populations in New Jersey streams tend to be relatively small the DFW has been reluctant to sacrifice the numbers of fish necessary to conduct extensive parasitologic and pathologic investigations. However, several studies have yielded some information on the occurrence of parasites and diseases in New Jersey's naturally reproducing trout populations.

As part of the Fish Health Project (F-35-R-NJ), a survey of the parasites of freshwater fishes in New Jersey was conducted over a twelve year period, from 1976 to 1987 (DFW, 1991). Forty-two trout were examined from over 2400 fish of various species that were collected statewide. Parasites found in these trout included protozoans (*Ichthyophthirius multifilis*, *Scyphidia*, and *Trichodina)*, monogenean (*Gyrodactylus*), trematodes (*Allocreadium lobatum* and *Crepidostomum farionis*), nematodes (*Sterliadochona tenuissima*, acanthocephalans *Acanthocephalus dirus* and *Leptorhynchoides thecatus*), and a parasitic crustacean (*Argulus*).

In August 1998, an investigation on the health status of trout in Van Campens Brook was conducted as part of the USFWS National Wild Fish Health Survey. Thirty-four brook trout and 53 rainbow trout were collected from the brook at Millbrook Village and examined for the presence of potential pathogens by USFWS fish health biologists. Pathogens of concern included IPN (infectious pancreatic necrosis), VHS (viral hemorrhagic septicemia), and IHN (infectious hematopoietic necrosis) viruses, *Aeromonas salmonicida* (furunculosis), *Renibacterium salmoninarum* (bacterial kidney disease), *Yersinia ruckeri* (enteric redmouth), and *Myxobolus cerebralis* (whirling disease). None of those pathogens were found in trout collected from Van Campens Brook.

It is interesting to note that Van Campens Brook had been stocked with trout by DFW on an annual basis from 1921 until 1982 when it was designated as a Wild Trout Stream. The stocked trout were reared at the Hackettstown Hatchery or were obtained from various hatcheries in the National Fish Hatchery System. Several of the pathogens targeted under the National Wild Health Survey had been endemic at the Hackettstown Hatchery during the years when Van Campens was stocked with hatchery fish. This study provided evidence that naturally reproducing trout populations free of major salmonid pathogens could be developed in waters that had been previously stocked with carriers of those pathogens.

Specific sources of parasite and disease introduction into New Jersey cannot be accurately determined. However, the importation of fish was likely responsible for the occurrence and spread of pathogens, particularly prior to the 1970's when hatchery fish health inspection and certification programs were begun by the U.S. Fish & Wildlife Service. For much of the period from 1912 through 1983, when the Hackettstown Hatchery produced trout, carriers of several bacterial, viral and parasitic diseases were stocked into waters throughout the state, including many waters which now contain naturally reproducing trout populations.

<ins>Opportunity</ins> – Investigate the feasibility of testing wild trout populations for the presence of pathogens known to be a concern to coldwater trout species. These include but are not limited to IPN (infectious pancreatic necrosis), VHS (viral hemorrhagic septicemia), and

IHN (infectious hematopoietic necrosis) viruses, *Aeromonas salmonicida* (furunculosis), *Renibacterium salmoninarum* (bacterial kidney disease), *Yersinia ruckeri* (enteric red-mouth), and *Myxobolus cerebralis* (whirling disease).

Fish Health Policies

Policies concerning fish introduction and fish health management were developed under the Federal Aid Fish Health Project (F-35-R) following review of all pertinent information on the distribution of parasites and diseases of freshwater fish in New Jersey, past and present stocking practices, and potential sources of pathogen introduction. Policies dealing with the stocking of fish into New Jersey lakes and streams were implemented in 1991 using the already existing stocking permit system.

Policy #1 *Standard operating procedures to reduce the introduction of troublesome pathogens at both the Pequest Trout Hatchery and the Charles O. Hayford Hatchery in Hackettstown will be followed.*

Pequest Trout Hatchery:

Rationale: A great number of other diseases and parasites may infect salmonids. These other organisms may not have applicable standard detection techniques, they may not be covered by other fish health plans, the risk of their introduction may not be as great, or the consequences of their introduction may not be as severe as the major pathogens that are specifically addressed in this policy. Included in this category are common external parasites such as *Ichthyophthirius* and *Trichodina* which may be thought of as a controllable annoyance rather than a serious problem. However, their introduction into the hatchery necessitates that some chemical control measures be taken or that fish cultural practices be modified. In some instances, sublethal effects such as reduced growth rates or increased food conversion rates may result. In any case, the impact of their presence can be measured economically either directly through the cost of treatment chemicals and feed, or indirectly due to a reduction in palatability, appearance, or stamina of the fish.

Fish stocks reared at the Pequest Hatchery were obtained as eggs from the USF&WS hatcheries with A-1 or A-2 classifications and have been annually inspected for pathogens of concern. The pathogens covered under this policy are organisms that realistically can and should be avoided. Standard techniques for their detection and identification are available and widely used. Many other fish health plans currently place restrictions on their introduction.

Rather than compile an extensive list of lesser concern disease organisms to guard against, this policy proposes general measures that will minimize the probability that any disease agent will be introduced. Since most organisms are not normally transmitted on or with eggs, limiting introductions into the hatchery to eggs will greatly reduce the probability that any agent will be introduced. Combining that measure with sanitation of the eggs with broad-spectrum germicides further reduces that probability. Other policies, such as the hatchery access guidelines and prohibition of fish stocking in the immediate vicinity of the hatchery, are general measures directed toward reducing the risk of any organism being introduced into the Pequest Hatchery.

Procedure: The following standard operating procedures will be followed to monitor and reduce the risk of pathogen introduction:

1) Periodic examination of all stocks using moribund fish when available, and thorough investigation of all unusual or unexplained mortality.
2) Annual inspection for the major pathogens:
   Infectious Pancreatic Necrosis Virus (IPNV)
   Infectious Hematopoietic Necrosis Virus (IHNV)
   Myobolus cerebralis (Whirling disease)
   Renibacterium salmoninarum (Bacterial Kidney Disease)
   Aeromonas salmonicida (Furunculosis)
   Yersinia ruckeri (Enteric Redmouth)

3) Iodophor disinfection (100 ppm iodine for 10 minutes) of all eggs transferred into the facility; and,

4) Periodic review and modification of hatchery access policy.

Hackettstown Hatchery

Rationale: Any organism capable of causing disease among the various species of fish raised at the Hackettstown Hatchery is considered undesirable. Various disease agents were introduced with fish brought in from various sources over the 80 years of the hatchery's existence, and the consequences were often devastating. While some of these diseases still continue to present an occasional problem, the effects of many have been neutralized through progressive management techniques. IPNV, furunculosis and whirling disease were all endemic in Hackettstown Hatchery stocks, but have not been found in annual salmonid inspections conducted over the past 10 years. In order to avoid the repetition of past mistakes, this policy takes steps to reduce the risk of introduction of pathogens not already present. Rather than to compile a list of pathogens of concern for each species reared at the Hackettstown Hatchery, general measures are proposed which will reduce the risk of any pathogen being introduced and allow for hatchery managers to weigh benefits versus risk in each proposed introduction.

Procedure: The following standard operating procedures will be followed to monitor and reduce the risk of pathogen introduction:

1) Propagation of fish species having brood stocks already present at the Hackettstown Hatchery should be done using those stocks; they should not be supplemented by wild fish or fish from other hatcheries unless there is a demonstrated need.
2) If adequate health information is not available on a stock of fish being introduced into the hatchery, the introduced fish should be held in an area of the hatchery where they are physically separated from hatchery fish stocks to the extent possible, and the effluent from their holding pond should be discharged directly from the hatchery and not used for rearing other fish.
3) Consideration should be given to developing hatchery brood stocks when possible rather than to depend on wild brood stock populations or other outside sources of eggs or juveniles.
4) If fish must be obtained from outside sources, they should be obtained as eggs whenever possible.
5) Eggs hatching and juvenile rearing should be done in areas separate from adult or brood stock holding areas using ultraviolet disinfection and egg disinfection (iodophor) when possible.
6) Routine health monitoring of all stocks and annual inspection of salmonids should be performed; and,
7) Resident fish should be removed from all springs and supply structures, and springs and water supply pipes should be disinfected.

Policy #2 *Introduction of new stocks of fish into the Pequest Hatchery to supplement or replace existing stocks will only be in the form of pathogen-free eggs.*

Rationale: Eggs must be obtained from a hatchery stock which has been annually inspected and found free of the following pathogens, and has no prior history of their presence: IPN, VHS, and IHN viruses, *Aeromonas salmonicida* (furunculosis), *Renibacterium salmoninarum* (bacterial kidney disease), *Yersinia ruckeri* (enteric redmouth), and *Myxobolus cerebralis* (whirling disease).

The above should be considered the minimal acceptable standard for introduction of fish into the Pequest Hatchery. A health history of the fish stock from which the eggs originate should be obtained in order to evaluate the potential for introducing other parasites and diseases.

Procedure: Inspection must be performed using sample sizes and methods recommended by the American Fisheries Society Fish Health Section (Thoesen 1994), those described in the USF&WS Fish Health Policy, or generally accepted methods published in peer-reviewed journals.

Policy # 3 A complete health history for any fish stock transferred from another fish culture facility to the Hackettstown Hatchery will be required.

Rationale: Health history information will be reviewed and an evaluation made on the probability of exposing hatchery fish stocks to pathogens not already present at the facility. The decision on whether or not to transfer the fish will be made on an individual case basis. Any salmonids introduced into the hatchery must be from stocks of fish that have been annually inspected and found free of the following pathogens and have no prior history of their presence : VHS virus, IHN virus, *Renibacterium salmoninarum* (bacterial kidney disease), and *Yersinia ruckeri* (enteric redmouth). It is further recommended that the fish be obtained from a stock that has been inspected and found free of IPN virus, *Aeromonas salmonicida* (furunculosis), and *Myxobolus cerebralis* (whirling disease) and has no recent (past 3 years) history of their presence.

Procedure: Inspection must be performed using sample sizes and methods recommended by the American Fisheries Society Fish Health Section (Thoesen 1994), those described in the USF&WS Fish Health Policy, or generally accepted methods published in peer-reviewed journals.

Policy # 4 A comprehensive fish health assessment will be performed before any stock of trout is to be considered for use as a brood stock, to provide eggs and fish for hatchery rearing.

Rationale: Round Valley Reservoir is the source of lake trout brood stock used in the Hackettstown Hatchery rearing program. IHN, VHS, and enteric redmouth are not present at the Hackettstown Hatchery and their introduction would have a potential impact on the lake trout rearing program or other salmonid rearing programs which might be undertaken in the future.

Procedure: The assessment should include inspection for IPN, VHS, and IHN viruses, *Aeromonas salmonicida* (furunculosis), *Renibacterium salmoninarum* (bacterial kidney disease), *Yersinia ruckeri* (enteric redmouth), and *Myxobolus cerebralis* (whirling disease) using standard procedures (American Fisheries Society Fish Health Section Blue Book 1994 or equivalent). Sample sizes for the inspection must be sufficient to detect an assumed incidence of 5% for the viral pathogens and 10% for the bacterial pathogen (all at 95% confidence levels).

Hatcheries which provide the appropriate documentation that they have been inspected and found free of the pathogens listed above will be certified for stocking in Round Valley Reservoir. A list of Certified Hatcheries will be maintained by the DFW and provided to individuals who request stocking permit applications for areas of special concern such as Round Valley Reservoir.

Policy # 5 All fish released into New Jersey waters under the fish stocking permit program must be procured from a hatchery that has been approved by the DFW.

Rationale: By statutory authority, N.J.S.A. 23:5-33.1, the stocking of any fish into the fresh waters of New Jersey requires a stocking permit from the DFW of Fish, Game, and Wildlife. The stocking permit regulation was originally intended to prevent the introduction of exotic species and other fish species that might conflict with management objectives in a particular body of water. The fish health management plan, however, allowed fisheries managers to also consider the health status of fish being stocked.

Infectious Hematopoietic Necrosis (IHN) and Viral Hemorrhagic Septicemia (VHS) are diseases which are not known to be present in New Jersey or elsewhere on the east coast of North America. IHN is endemic in some west coast salmonid stocks and VHS is found in Europe and recently was detected in salmon returning to several hatcheries in Washington State. Because IHN and VHS pose a potential threat to native and cultured fish stocks in New Jersey and throughout the east, special precautions are necessary to prevent their introduction. Based upon information on the distribution of fish pathogens and on past stocking practices, it is believed that fish from hatcheries outside of the endemic range of IHN and VHS provide a minimal risk of introducing new fish pathogens into the majority of fish populations in New Jersey. However, in some waters where particularly sensitive fish populations exist, a higher degree of certainty about the disease status of introduced fish is necessary. For those waters of special concern, hatcheries may be required to provide documentation showing that all fish stocks have been inspected and found free of serious fish pathogens.

Procedure: To obtain approval a fish culture facility must comply with the following:

(1) Annually submit a "Health History Request Form" indicating which fish species are offered for sale, the origin of all fish stocks, and their health status; and
(2) Provide documentation (health inspection or certification reports) that all fish (including eggs or gametes) received from sources within the enzootic area of IHN or VHS viruses, have been inspected and found free of those viruses; and
(3) Provide documentation that a complete health inspection (including parasitological examination) has been performed on all fish stocks, which have been obtained from the wild.

In addition, fish culture facilities located west of the continental divide, or outside of North America, must comply with the following:

(1) Provide documentation that all stocks of fish reared in the hatchery have been inspected and found free of IHN and VHS viruses, the PKX organism, and *Ceratomyxa shasta*; and,
(2) Ship only fertilized eggs, which have been subjected to iodophor disinfection. No salmonid fish (fry, fingerling, or adult) other than certified, disinfected eggs may be brought into New Jersey from areas where IHN or VHS viruses are enzootic in salmonid stocks. Other species of fish may be brought into New Jersey if they are not considered potential carriers of the VHS or IHN viruses and the source hatchery must provide documentation that a complete health inspection (including parasitological examination) has been performed.

A list of commercial hatcheries which have submitted the above information will be maintained by the DFW and sent to all individuals requesting a stocking permit application. Hatcheries will be given the opportunity to be placed on the list at any time by completing a health history request form and providing the required health documentation. Hatcheries which do not meet the criteria listed above, or fail to provide the necessary information, or provide false information on the health history request form will not be included on the list. Stocking permit applications which include a source hatchery which is not included on the list will be denied.

The responsibility for and cost of any fish health inspections required for approval shall be borne by the individual importing the fish or by the hatchery of origin. The inspection should be conducted by a qualified individual at the place of origin. Inspection must be performed using sample sizes and methods recommended by the American Fisheries Society Fish Health Section (Amos 1985), those described in the USF&WS Fish Health Policy, or generally accepted methods published in peer-reviewed journals.

Policy # 6 *No fish stocking permits will be approved to stock any species of fish in the Pequest River within the Pequest WMA.*

<u>Rationale:</u> No major diseases or parasites of salmonids have been found in fish at the Pequest Hatchery and any disease which is introduced into the hatchery may cause fish mortality and increase operating costs. The portion of the Pequest River within the Pequest WMA is immediately adjacent to the Pequest Trout Hatchery and the potential for pathogen transmission from infected stocked fish is very high. The only fish that will be stocked in the Pequest River within the Pequest WMA will be trout reared at the Pequest State Fish Hatchery. Hatchery managers, the fish pathologist and the regional fisheries biologist will evaluate the stocking of ponds on Pequest River

tributaries with warmwater fish from the Hackettstown Hatchery on an individual case basis.

Policy # 7 Applications for permits to stock salmonids in waters within the Pequest River drainage, outside of the Pequest Wildlife Management Area, will be evaluated based upon the risk of exposure of Pequest Hatchery stocks to potential diseases or parasites, and considered for approval at the discretion of the regional fisheries biologist, fish pathologist, and hatchery superintendent.

<u>Rationale:</u> No major diseases or parasites of salmonids have been found in fish at the Pequest Hatchery and any disease which is introduced into the hatchery may cause fish mortality and increase operating costs. The major salmonid pathogens are of primary concern when evaluating an application. The restriction is limited to certifiable pathogens of salmonids (i.e. those for which detection methods are available and currently in use), rather than a complete ban on fish stocking in the Pequest River watershed. This would allow clubs and landowners to stock fish in waters under their control while minimizing the risk of introducing fish pathogens into the Pequest Hatchery.

<u>Procedure</u>: If it is determined that there is sufficient risk that stocked fish will enter the Pequest WMA or might expose Pequest Hatchery stocks to potential diseases or parasites, they must be obtained from a hatchery production lots which have been inspected within the previous 12 months and found free of the following pathogens, and have no recent (3 year) history of their presence: IPN, VHS, and IHN viruses, *Aeromonas salmonicida* (furunculosis), *Renibacterium salmoninarum* (bacterial kidney disease), *Yersinia ruckeri* (enteric redmouth), and *Myxobolus cerebralis* (whirling disease). Hatcheries will be required to provide documentation that during the past year fish from the same lot(s) have been inspected using standard procedures (American Fisheries Society Fish Health Section Blue Book or equivalent) and found free of the pathogens listed above. Sample sizes for the inspection must be sufficient to detect an assumed incidence of 5% for the viral pathogens, 5% for *Myxobolus cerebralis,* and 10% for the bacterial pathogens (all at 95% confidence levels). Hatcheries which provide the appropriate documentation that they have been inspected and found free of the pathogens listed above will be certified for stocking in the Pequest River drainage. A list of Certified Hatcheries will be maintained by the DFW and provided to individuals who request a stocking permit application for areas of special concern such as the Pequest River drainage.

Policy # 8 No permits will be issued for stocking fish in the Trout Brook watershed upstream of the Hackettstown Hatchery.

<u>Rationale</u>: Trout Brook flows through the Hackettstown Hatchery property and provides supplemental water for much of the pond rearing operation. Any

parasites or diseases introduced into the Hackettstown Hatchery would be difficult to eradicate because of the extensive system of ponds and resident fish populations within the facility. The introduction of any new parasites into the fish stocks would necessitate chemical control measures and thereby increase operating costs. The only fish that may be stocked in Trout Brook will be those fish reared at the Pequest Trout Hatchery and Hackettstown Fish Hatchery.

Policy # 9 Permits to stock salmonids in trout production waters (including potential trout production waters) will only be issued if the source hatchery is certified free of Myxobolus cerebralis (whirling disease).

Rationale: *Myxobolus cerebralis* has been associated with declines of salmonid populations in western North America, particularly rainbow trout, by causing mortality of fry. It has been found to develop in oligochaetes through various stages to a point where it is infective to salmonid hosts. Stocking of trout infected with *Myxobolus cerebralis* could result in its establishment in oligochaete populations and subsequently impact existing populations of wild trout or prevent the development of reproducing populations in waters otherwise suitable for trout reproduction.

Procedure: Hatcheries will be required to provide documentation that during the past year fish from the lot(s) to be stocked (or from a more susceptible species of salmonid reared in the same facility on the same water supply), have been inspected using standard procedures (American Fisheries Society Fish Health Section Blue Book or equivalent) and found free of *Myxobolus cerebralis*. Sample sizes for the inspection must be sufficient to detect an assumed incidence of 5% (at a 95% confidence level). Hatcheries which provide the appropriate documentation that they have been inspected and found free of the *Myxobolus cerebralis* (whirling disease) will be certified for stocking in trout production waters. A list of Certified Hatcheries will be maintained by the DFW and provided to individuals requesting permission to stocking salmonids in waters of special concern.

Management of Cultured Trout

Overview

Angler demand for trout challenges fishery managers to develop programs and strategies aimed at providing this user-group with a satisfying angling experience. Trout propagated in a hatchery setting provide resource managers with an effective management tool for creating and enhancing recreational coldwater fisheries. The DFW propagates trout at two facilities, the Pequest Trout Hatchery (primary facility) and the Charles O. Hayford Fish Hatchery at Hackettstown. Cultured (hatchery-reared) brook, brown, rainbow, and lake trout are stocked in a variety of settings and seasons and provide the major opportunity to fish for coldwater species statewide, both seasonally and year round. A survey of New Jersey anglers indicated that 47 percent of anglers purchased a trout stamp in 2002 (Responsive Management 2003). The majority of trout anglers fished for trout during the spring (84 percent) and fished for stocked trout (82 percent). In 2002 over 750,000 catchable and sub-catchable trout were reared and stocked during the spring, fall, and winter. This stocking program has an associated economic cost and must be managed to provide the most benefit to the angling community.

Management Strategies for Cultured Trout

The DFW currently has three trout stocking programs that utilize catchable trout (spring, fall and winter seasons), and two programs that utilize subcatchable trout (sea-run brown trout and lake trout). The spring stocking program is by far the largest and most popular of the trout stocking programs, but the other stockings programs are successful in providing additional opportunities for New Jersey anglers. These programs are described more fully later in this section,

The DFW's stocking programs are guided by two basic management strategies, "Put-and-Take" and "Put-Grow-and Take," which are intended to maximize the benefits of stocked trout to the angler.

Put-and-Take Management Strategy: Catchable-size brook, brown, and rainbow trout are stocked for immediate harvest to provide a short-term, seasonal fishery. Survival of stocked trout through the summer period is not expected (or poor) because suitable summer trout habitat (temperature < 21°C and dissolved oxygen > 4 mg/L) is absent, marginal, or sporadic. The trout-stocked waters managed under this stocking strategy include park ponds, shallow lakes, and warmwater streams. These waters are stocked in the spring and may be stocked again under the fall or winter program.

Put-Grow-Take Management Strategy: Brook, brown, rainbow, and lake trout are stocked for immediate and/or delayed harvest to provide a long-term, year-round fishery. Suitable habitat is consistently available to sustain trout throughout the year such that survival and growth of unharvested, stocked trout over more than one growing season is expected. Trout-stocked waters managed under this stocking strategy, that are stocked with catchable trout, include coldwater streams and deep lakes that are capable of supporting trout year round, where wild trout populations are limited or absent. These waters are stocked in the spring and may be stocked again in the fall or winter. Subcatchable lake and brown trout are stocked under the lake trout and sea-run brown trout programs.

Opportunity – Management goals and objectives need to be established for put-and-take and put-grow-and-take stocking management strategies.

Spring Trout Stocking Program

The traditional trout fishery in New Jersey occurs in the spring and revolves around the season opener in early April that is eagerly anticipated by anglers. Approximately 575,000 catchable-size brook, brown, and rainbow trout (10.5-inch average size) are reared annually for the spring program. These trout are liberated over a ten-week period in 200 ponds, lakes, and stream segments statewide (Figure 10). A three-week "pre-season" period precedes the "opening day" of the trout season in April, during which most trout-stocked waters are closed to fishing and are heavily stocked. A seven-week "in-season" period follows opening day during which the frequency and quantity of trout stocked decreases incrementally for most waters (consult the Allocation Methodology for Cultured Trout section for a fuller explanation). During the spring period, the harvest of trout is encouraged in most of these waters through a liberal harvest regulation (6 trout per day, 7-inch minimum size).

Waterbody Selection Criteria

The addition or permanent deletion of waters to the State's trout stocking program must be done through the Fish Code process. The lengthy process involves Fish and Game Council approval, publication in the New Jersey Register, a two-month public comment period, a public hearing, and attorney review (see Trout Fishing Regulations section for specific details).

Opportunity – Specific criteria for expanding the trout stocked waters needs to be developed.

Opportunity – Identify current trout stocked waters having limited access, thereby offering only limited fishing opportunities and determine if stocking should be discontinued or if access issues can be rectified.

Trout Allocations

Allocations for waters are determined using a formula developed under a Trout Stocking Improvement Plan that was implemented in 1990. The formula takes into consideration stream size, access, proximity to other trout stocked waters, and population. A specifically designed computer program is used to generate weekly allocations based on the variables assessed for each water and hatchery production numbers. Numbers allocated to individual waters may change from year to year, although usually not substantially, depending on the addition or deletion of waters to the program or adjustments to variables for individual waters.

Opportunity – The frequency of stocking during the spring stocking period should be examined to determine if it provides for the most quality and satisfying angling experience possible.

Species Selection Criteria

For each trout-stocked water, the trout species that will have the least impact upon the resident fish population, and provide the highest survival and angler catch rates, shall be selected for stocking.

For many waters, the species selection is not critical and brook, brown, and rainbow trout may be stocked in any combination. However, in these situations brook trout are typically stocked early on because their willingness to bite usually results in high angler catch rates and satisfaction on opening day. By the 1st or 2nd week following opening day, when the hatchery supply of available brook trout has been exhausted, rainbow trout are then stocked. Towards the end of the spring stocking season (4th or 5th week), brown trout are stocked. Most waters stocked late in the season are generally capable of supporting trout year round and brown trout survival rates in these waters are generally better than the other two species.

The trout species selected for stocking in some waterbodies may be critical to ensuring their survival or that of the resident fish population, or in achieving waterbody-specific management objectives. Trout-stocked waters that fall into one of six categories listed below are stocked with the cultured trout species specified.

1) Trout Production Streams – Streams having reproducing trout populations are stocked with a cultured species that minimizes unfavorable interactions (interbreeding, inter-specific competition, etc.) with the reproducing species as follows:

Reproducing trout species	Acceptable cultured trout species
brook	rainbow
brown	brook and/or rainbow
rainbow	brook
brook and brown	rainbow
rainbow and brown	brook
brook and rainbow	rainbow or brook (the opposite of the dominant wild species)

The frequency of the stockings are based upon the size of the streams, based on flow, some are stocked only three times while others are stocked each week. Although current stocking practices are designed to minimize the impacts of stocking cultured trout in streams already supporting natural populations the consequences of these stockings on the natural populations has not been investigated.

Opportunity – Through review of scientific literature and field sampling results the impacts of stocking cultured trout in small trout production streams should be investigated to determine if alternative stocking practices are warranted.

2) Low pH Waters – Streams and lakes which have been identified as having poorly buffered, low pH (< 5.5) conditions are stocked with brook trout due to the species ability to tolerate low pH conditions.

3) Trophy Trout Lakes – Waters regulated as trophy trout lakes are stocked with ⅓ rainbow trout and ⅔ brown trout. There are currently two trophy trout waters, Round Valley Reservoir (Hunterdon) and Merrill Creek Reservoir (Warren). Trophy trout lakes are stocked three times during the spring season and since trout are sub-legal due to the increased size limit on these waters they are not stocked during the pre-season period.

4) Holdover Trout Lakes – Waters regulated as holdover trout lakes are stocked with ¼ rainbow trout and ¾ brown trout. These waters have sufficient summer habitat conditions to support trout year round. The creel on these waters is reduced, 2 and four respectively, from the 6 and 4 limits of general regulated waters. These waters are stocked pre-season, followed by 3 in-season stockings. They are currently stocked close to opening day for fear of illegal harvest during the pre-season period where catch and release is permitted on these specially regulated waters.

   Opportunity – Investigate the feasibility of stocking holdover lakes earlier in the pre-season period to promote fishing during the pre-season closure period. Although some illegal harvest may occur, recreational benefits may outweigh this concern.

5) Marginal Trout Lakes – Lakes having marginal summer trout habitat (i.e. holdover trout are occasionally, but not regularly, caught) are stocked early in the season with brook and rainbow trout and receive brown trout during their last in-season stocking. A number of these waters historically supported trout year round but over the years declining water quality has resulted in the reduction or elimination of summer trout habitat.

   Opportunity – The benefits of re-allocating trout from large marginal/non-trout lakes and reservoirs, where angler returns and interest is greatly reduced, to smaller non-trout lakes where angler returns are much higher should be investigated.

6) Trout Maintenance and Select Nontrout Streams – Streams in which trout survive year round or have marginal survival during the summer, and are stocked In-season Weeks 6 and/or 7, shall be stocked with brown trout, at a minimum, during those two weeks (if scheduled for stocking). Trout maintenance waters regulated as Year Round Trout Conservation Areas are stocked in the early days of pre-season stocking since they are open to fishing, catch and release only, when the vast majority of trout stocked waters are closed.

Opportunity – Investigate the feasibility of increasing the current allotment of brown trout, at the expense of brook and rainbow stockings, on trout maintenance waters currently regulated as Year Round Conservation Areas that do not have reproducing trout populations.

Opportunity – Special regulated waters have grown in popularity, increasing angling pressure, investigate the feasibility of increasing in-season stockings on these waters.

Opportunity – To improve angler satisfaction, investigate the feasibility of stocking a higher percentage of brown trout, particularly in the larger trout maintenance waters.

7) Non-trout Lakes and Streams – Lakes and streams that lack the capability to support trout during the critical summer months are stocked with brook and rainbow trout. The proportion of each particular species stocking is dependent on hatchery production.

Size Selection Criteria

The size of catchable trout that will have the least impact upon on the resident fish population, is compatible with the available habitat, and will provide a high return to the creel is selected for stocking. Catchable-size trout stocked in the spring are categorized into two sizes – quality (10.5 inch average) and broodstock, sometimes referred to as breeders (15 inches and larger). All waters stocked with trout in the spring receive quality-size trout. Broodstock are mixed in with the quality trout early in the stocking season (2% per load, until the supply is exhausted) unless the receiving water falls into one of the following four categories:

1) Trout Production Streams – These streams contain naturally reproduced trout that are seldom more than 12 inches long and do not compete well with the much larger broodstock trout.
2) Trophy Trout Lakes – Quality-size stocked trout stocked in these lakes are able to grow to trophy size in 1 – 2 years, negating the need to stock larger broodstock.
3) Holdover Trout Lakes – Quality-size stocked trout stocked in these lakes are able to grow to trophy size in 1 – 2 years, negating the need to stock larger broodstock.
4) Small Streams – Streams less than 33 feet wide and having flows less than 19 CFS (identified as Category D, E, and F in the trout-stocked waters database) that do not have a sufficient living space to adequately accommodate the larger broodstock.

Opportunity – In order to improve angler satisfaction, investigate the feasibility of stocking broodstock into identified lakes each spring to increase angling activity on these waters. Specific waters receiving broodstock would change each year. Consider the feasibility of stocking the larger fish during week 2 or 3 of the in-season period to generate renewed interest when typically angler interest in trout begins to decline.

Trout Distribution

The distribution of over 575,000 trout to 1,000 stocking points on 180 waterbodies, multiple times over a ten week period requires substantial internal agency communication, cooperation and coordination. The stocking schedule divides the waterbodies into individual loads for each day of the ten-week period. A load is typically comprised of several waterbodies within a general given area that is placed onto a truck and as many as eight trucks are dispatched each day. A variety of factors including the number and species of fish, proximity of waters, number of stocking points, waterbody regulations, distance traveled, available trucks, experienced staff, must be considered in determining the composition of each load. The Pequest Trout Hatchery has eight trucks each capable of transporting a maximum load of 2,000 pounds of fish, or approximately 4,000 catchable trout. Staff from the DFW's Bureau of Land Management (BLM) is assigned to drive the trucks during the 10-week spring stocking period. To reduce the cost and drain on personnel, the BLM also organizes volunteers (members of the DFW's Wildlife Conservation Corps) to assist drivers in stocking trout.

The Bureau of Freshwater Fisheries manages the list of more than 1,000 stocking points using a specifically designed database. Stocking locations are selected based upon public access, proximity to other stocking points, and accessibility for both anglers and hatchery trucks. Suggestions for additional stocking locations come from many sources including DFW personnel, the Fish and Game Council, sportsmen groups, local municipalities, landowners, and the general public. Regional fisheries biologists, BLM personnel and DFW law enforcement officials review potential stocking sites. Trout are stocked on waters that flow through privately owned land provided the owner allows the public access to the water. The DFW promotes an "ask first" policy when anglers are unfamiliar with a particular stream stretch. Unethical behavior by anglers such as destruction of property, garbage, and excess noise can result in stocking points being removed at the request of the landowner. Unfortunately, a number of sites are lost each year to such behavior. Stocking points are also removed due to change in land ownership, hazardous conditions, lack of angler participation, or adjacent development. The loss of stocking points, along a waterbody, can ultimately result in reduction of trout allocated in subsequent years.

A list of stocking points for waterbodies on a specific load are prepared for drivers using a specifically designed program. In addition to stocking point information, load sheets include driving directions, percentage of the load each point should receive, species to be stocked, and any additional pertinent information (i.e. trout tagging studies, float stocking details, specific stocking requirements for special regulation areas, and meeting locations for any necessary transfers of fish or personnel). The load sheets provide good communication between drivers, regional biologists and hatchery staff. The sheets are returned at the end of each route and suggestions for improvements or difficulties encountered can be relayed to appropriate staff.

In areas that cannot be accessed by large hatchery trucks, due to weight or physical barriers, fish are dispersed to smaller transfer trucks along route. Although the use of transfer trucks requires additional manpower it provides for a more equitable distribution of fish particularly in more remote stream stretches. In addition, they can save valuable time by allowing small lakes and ponds to be stocked along route while the larger trucks continues to disperse trout to other areas.

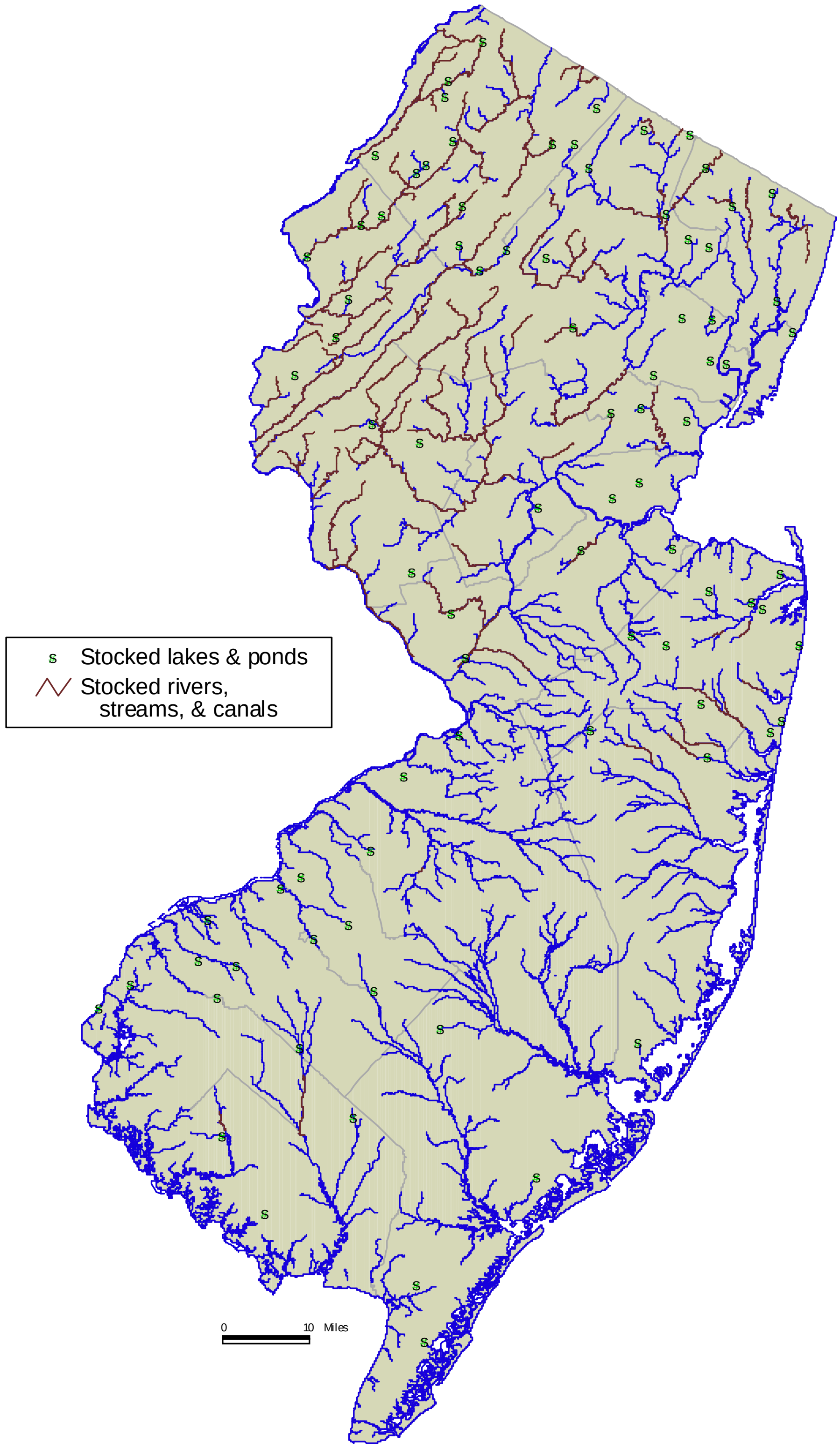


FIGURE 10.— New Jersey's trout-stocked waters for spring 2005.

Fall Trout Stocking Program

This stocking program was initiated in 1987 and is intended to complement the spring program and expand trout fishing opportunities statewide. Trout fishing typically tapers off during the summer when conditions are least favorable for trout (higher water temperatures and low stream flows) and anglers are less successful (fewer, more wary, trout). In October, as surface waters begin to cool, trout are stocked again to entice anglers to return to trout fishing. The 2003 angler survey found 47% of trout fisherman fished during the fall

Waterbody Selection Criteria

All streams with designated in-season stocking closures for the spring trout stocking program are stocked during the fall period. In addition, the Maurice River and 16 ponds/ lakes located in the southern portion of the state are also stocked to provide for a more equitable distribution of trout fishing opportunities across the state.

Trout Allocation

The fall baseline is 47,750 yearling rainbow trout, averaging ten inches, which are stocked in 16 northern and central-coastal streams and 16 southern ponds and lakes (Figure 11). The number of trout allocated to streams is 40,000 and individual stream allocations are determined using the formula concept developed under the Trout Stocking Improvement Plan. The formula takes into consideration stream size, access, proximity to other trout stocked waters, and human population density. A specifically designed computer program uses the stream's spring pre-season allocation to generate a reduced fall allocation, using the 40,000 fall baseline figure established for streams. Individual fall allocations for streams may vary from year to year, although usually not substantially, when adjustments are made to variables for individual waters. The baseline allocation for all fall-stocked impoundments was set at 7,750 trout when the fall program was first initiated. At that time, individual waterbody allocations were set by the Fish and Game Council, in consultation with Bureau staff, and have changed little over the ensuing years,

Species Selection

All waters stocked during the fall trout stocking program, from its prior to 2005 have received rainbow trout. Beginning in 2006 all three trout species (brook, brow, and rainbow) will be reared for release under the fall stocking program.

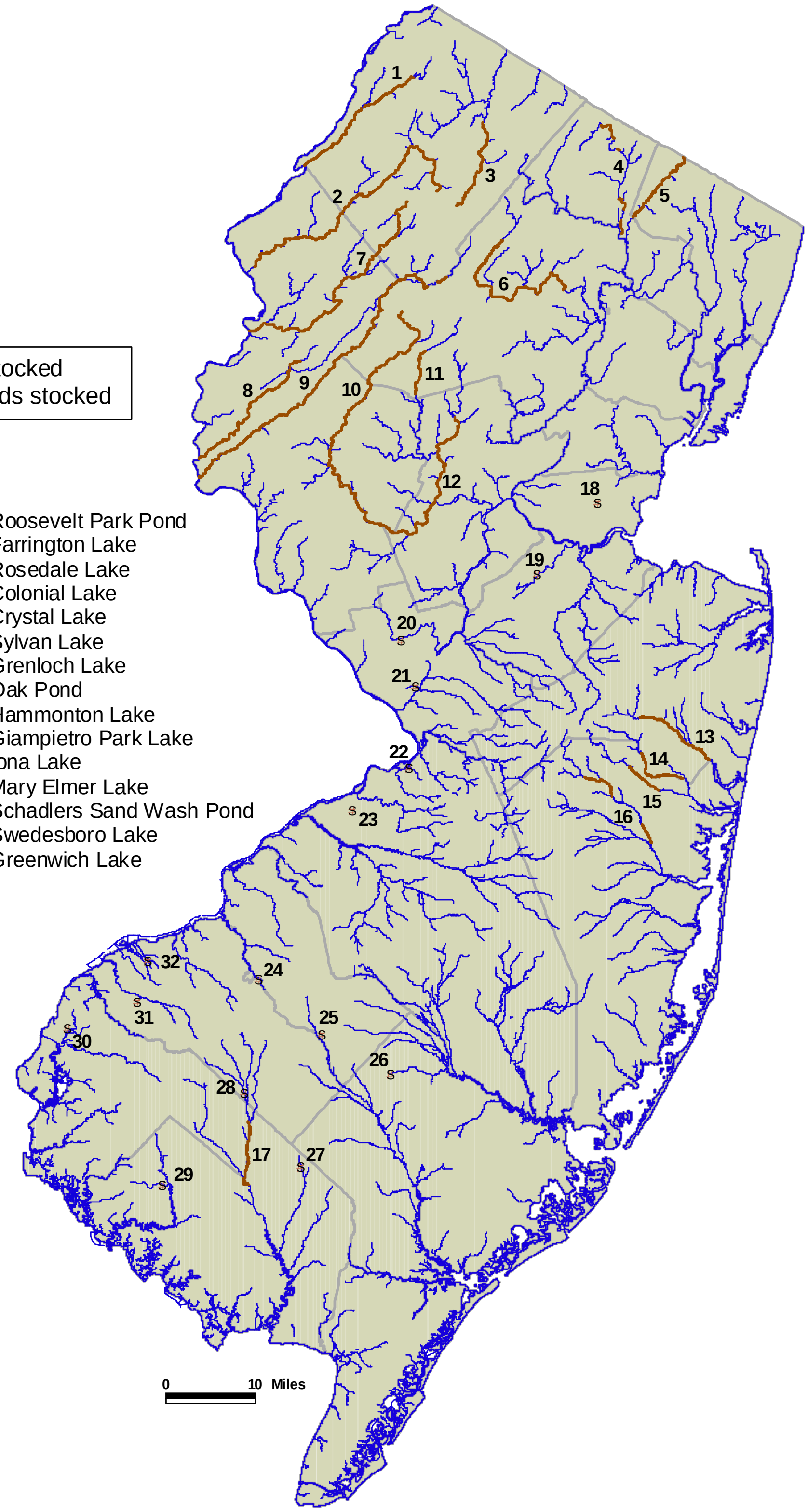
Size Selection Criteria

From the inception of the fall trout stocking program in 1987, through 2005, fall trout-stocked waters received yearling production fish 9 to 11 inch average size. Approximately 1,000 three-year old broodstock rainbow trout, averaging 17 - 18 inches, are also released during the fall stocking period.

Distribution

Distribution of trout during the fall program follow the same stocking points and designations as established for the spring. Prior to 2005 waterbodies were stocked for three weeks, beginning with the first full week of October. Since 2005, the stocking period has been shortened to two weeks, to facilitate the production of larger trout for the 2006 fall stocking program.

Streams stocked
s Lakes/Ponds stocked



1 Big Flat Brook
2 Paulinskill River
3 Wallkill River
4 Wanaque River
5 Ramapo River
6 Rockaway River
7 Pequest River
8 Pohatcong Creek
9 Musconetcong River
10 S/Br. Raritan River
11 Black River
12 N/Br. Raritan River
13 Manasquan River
14 N/Br. Metedeconk River
15 S/Br. Metedeconk River
16 Toms River
17 Maurice River

18 Roosevelt Park Pond
19 Farrington Lake
20 Rosedale Lake
21 Colonial Lake
22 Crystal Lake
23 Sylvan Lake
24 Grenloch Lake
25 Oak Pond
26 Hammonton Lake
27 Giampietro Park Lake
28 Iona Lake
29 Mary Elmer Lake
30 Schadlers Sand Wash Pond
31 Swedesboro Lake
32 Greenwich Lake

FIGURE 11.— New Jersey's trout-stocked waters for fall 2005.

Winter Trout Stocking Program

During the late fall and winter interest in trout fishing typically wanes when shorter day length, colder air and water temperatures, and inclement weather discourage angler outings. The Winter Trout Program was initiated in 2000 to add variety to the DFW's trout program by offering anglers the opportunity and incentive to venture forth and brave the winter elements in pursuit of trout. Under this program approximately 12,000 catchable-size rainbow trout (11-inch average size) are stocked in 24 lakes and ponds statewide (Figure 12).

A measurable objective of this program is to provide a fishery that results in a catch (or harvest) rate of at least 50% or angler usage equivalent to one angler trip generated per trout stocked. Results from a tagging study completed during the first year of the program were extremely promising, with six of eight study lakes reporting tag returns between 38 and 45%. As expected, two of the larger lakes within the program, Shepherd Lake and Furnace Lake, had lower than expected return rates of 13.3% and 25 %, respectively. Catch rates or harvest rates are likely higher than the tag returns indicate because reported because not all angler comply by returning tags from trout that they catch.

Winter-stocked trout that are not harvested during the winter period can add to angling opportunity the following spring. This was documented at several lakes, where the percentage of tagged trout caught after opening day was equal to or greater than the percentage caught during the winter season. This was partially attributed to several factors, including the presence of ice on lakes where ice fishing was not permitted (Verona Park Lake) or the presence of unsafe ice that limited angling for an extended period (Amwell Lake).

Three years after the initiation of the winter trout program, when the 2003 angler survey was completed, an encouraging 20 percent of trout anglers went fishing during the winter (Responsive Management 2003). In the northern part of the state, ice fishing is the primary mode of fishing targeted by this stocking program. However, the winter program is not entirely geared to ice fishing, as the presence of safe ice varies annually and seldom occurs in south Jersey.

<u>Waterbody Selection Criteria</u>

At the inception of the winter trout stocking program, the Fish and Game Council, in consultation with the Bureau selected lakes already approved for stocking under the spring trout stocking program. Lakes selected were less than 110 acres, having a moderate amount of shoreline access and/or a boat launch site having a publicly maintained access road during the fall and winter. Lakes already stocked under the fall program were excluded from the winter program. Precedence was given to smaller waterbodies because they offer a higher rate of return by anglers. Lakes were also selected for geographic distribution throughout the state.

Trout Allocation

The winter baseline is 12,940 yearling rainbow trout, averaging 9-11 inches, that are stocked in 24 ponds and lakes statewide (Figure 12). The Fish and Game Council established individual allocations for winter trout-stocked lakes at the inception of the program, in consultation with Bureau staff. Winter trout allocations are similar to each waterbody's respective spring pre-season allocation, with the exception that winter allocations on waters having established and consistent ice fisheries were increased over pre-season allocations. No individual waterbody receives more than 1,000 trout. Over the years there has been little change to the program, with the exception of a few waterbody changes.

Species Selection

All winter trout- stocked waters receive rainbow trout.

Size Selection Criteria

All winter trout- stocked waters receive production fish ranging from 10 to 11 inches in size.

Distribution

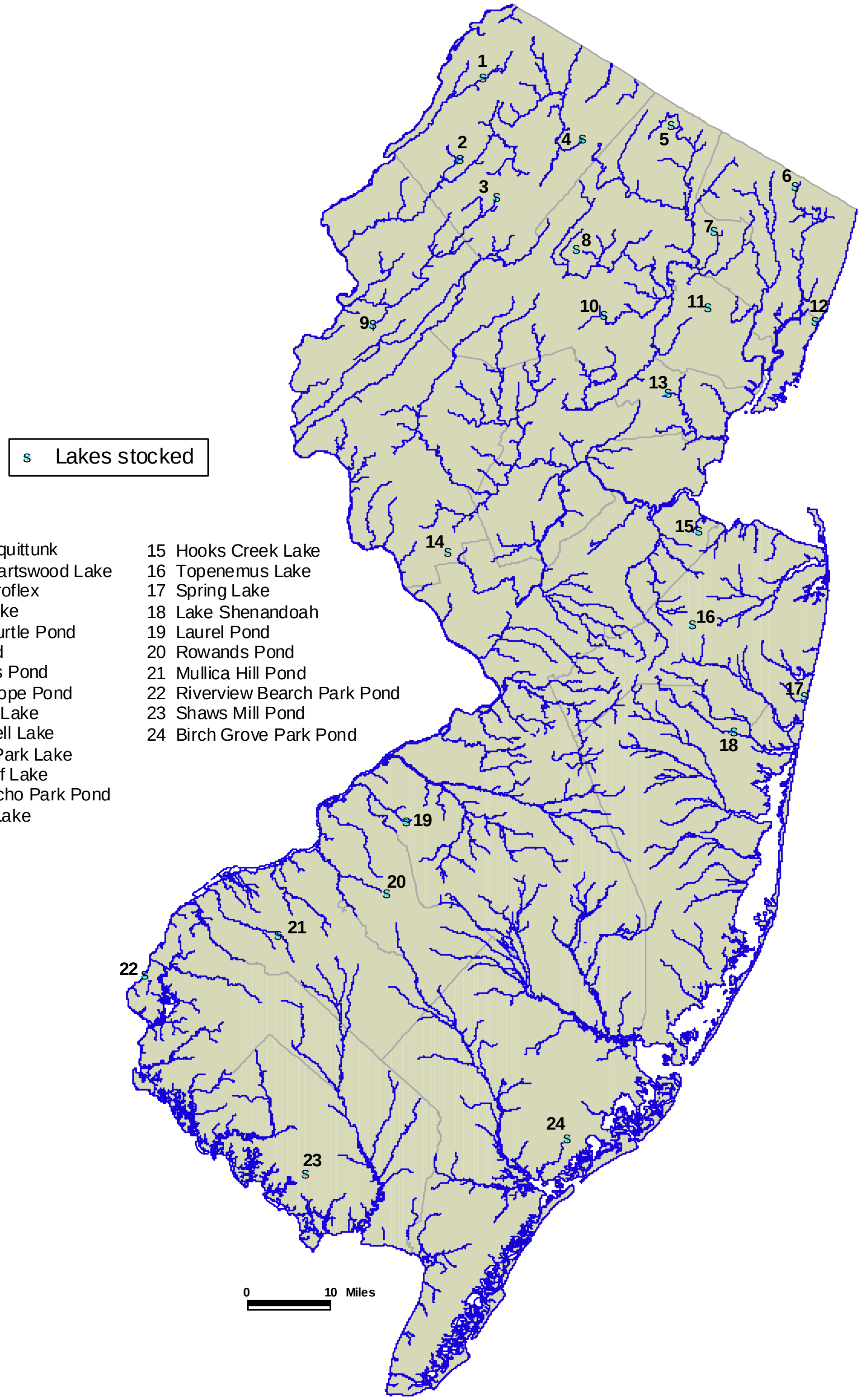
The distribution of trout into lakes stocked under the winter program occurs at the same stocking points and designations as established under the spring stocking program. Prior to November 2004, lakes located in the northern region of the state were stocked several days before Thanksgiving Day and south Jersey lakes were stocked during the first week in January. Since that time (commencing November 2004) all winter trout-stocked lakes have been stocked during the three days preceding Thanksgiving Day. This scheduling change increases the availability of freshly stocked trout, over a longer period of time, coinciding with the holidays

.

New Jersey's Winter Trout-Stocked Waters and Trout Allocations								
Name[1]	County	Surface acreage	Year Stocked and Trout Allocation[2]					
			2000-2001	2001 – 2002	2002 – 2003	2003 – 2004	2004	2005
Amwell Lake (N)	Hunterdon	10	410	410	410	410	410	410
Barbours Pond (N)	Passaic	12	420	420	420	420	420	420
Birch Grove Park Pond (S)	Atlantic	30	460	460	460	460	460	460
Furnace Lake (N)	Warren	53	900	900	900	900	900	900
Green Turtle Pond (N)	Passaic	72	-	-	-	-	770	770
Haddon Lake (S)	Camden	10	-	-	250	250	480	480
Hook's Creek Lake (N)	Middlesex	10	520	520	520	520	520	520
Lake Aeroflex (N)	Sussex	101	1,000	1,000	1,000	1,000	1,000	1,000
Lake Ocquittunk (N)	Sussex	8	500	500	500	500	500	500
Lake Shenandoah (S)	Ocean	50	580	580	580	580	580	580
Laurel Pond (S)	Burlington	3	250	250	-	-	-	-
Little Swartswood Lake (N)	Sussex	75	1,000	1,000	1,000	1,000	1,000	1,000
Lower Echo Lake (N)	Union	6	420	420	420	420	420	420
Mill Pond (N)	Bergen	9	400	400	400	400	400	400
Mt. Hope Pond (N)	Morris	18	410	410	410	410	410	410
Mullica Hill Pond (S)	Gloucester	10	410	410	410	410	410	410
Riverview Beach Pond (S)	Salem	5	420	420	420	420	420	420
Rowands Pond (S)	Camden	3	250	250	250	250	250	250
Shaws Mill Pond (S)	Cumberland	30	510	510	510	510	510	510
Shepherd Lake (N)	Passaic	72	1,000	1,000	1,000	1,000	-	-
Silver Lake (N)	Sussex	21	600	600	600	600	600	600
Speedwell Lake (N)	Morris	23	520	520	520	520	520	520
Spring Lake (S)	Monmouth	16	480	480	480	480	480	480
Topenemus Lake (S)	Monmouth	21	470	470	470	470	470	470
Verona Park Lake (N)	Essex	13	500	500	500	500	500	500
Woodcliff Lake (N)	Hudson	15	510	510	510	510	510	510
		TOTALS	12,940	12,940	12,940	12,940	12,940	12,940

[1] N = northern lake/pond; S = southern lake/pond.

[2] During the first four winters of the stocking program (December, 2000 through January, 2004), the northern lakes/ponds were stocked in November (during the 3 week-days prior to Thanksgiving Day) and the southern lakes/ponds were stocked during the 1st full week in January (Monday and Tuesday). Beginning with the winter of 2004-2005, winter stocking occurred during the 3 weekdays prior to Thanksgiving Day (i.e. beginning November, 2004).



1 Lake Ocquittunk
2 Little Swartswood Lake
3 Lake Aeroflex
4 Silver Lake
5 Green Turtle Pond
6 Mill Pond
7 Barbours Pond
8 Mount Hope Pond
9 Furnace Lake
10 Speedwell Lake
11 Verona Park Lake
12 Woodcliff Lake
13 Lower Echo Park Pond
14 Amwell Lake
15 Hooks Creek Lake
16 Topenemus Lake
17 Spring Lake
18 Lake Shenandoah
19 Laurel Pond
20 Rowands Pond
21 Mullica Hill Pond
22 Riverview Bearch Park Pond
23 Shaws Mill Pond
24 Birch Grove Park Pond

FIGURE 12.— New Jersey's trout-stocked waters for winter 2005.

Sea-Run Brown Trout Stocking Program

Brown trout will, after a period of freshwater residence, often migrate out to an estuary for one to two years to take advantage of an abundance of forage fishes. These migratory trout are called sea-run brown trout. The publicly accessible Manasquan River, in Monmouth County, has been stocked with trout for a number of decades under the spring stocking program, to provide a put-grow- and-take fishery. Periodically, a sea-run trout, usually a brown trout, is caught. These reported captures suggested that it might be possible to create a sea-run brown trout fishery in this Atlantic coast river.

From 1957 to 1962, low numbers of brown trout were periodically stocked in the Manasquan River. Fish stocked in 1961 and 1962 were from eggs of a "sea trout" strain obtained from Denmark and Scotland, however, they did not establish a successful fishery. This lack of success was attributed to insufficient numbers of fish being stocked over a short period of time to establish such a fishery.

In 1997 a pilot program was initiated on the Manasquan River, using surplus brown trout from the May sorting period at the Pequest Trout Hatchery. Since then, the Pequest Trout Hatchery has annually produced 18,000 – 30,000 eight-inch brown trout for this program. As of 2003, approximately 209,000 fish have been stocked over the seven-year period. The fish are stocked late October in the tidal freshwater and brackish portions of the Manasquan River. Trout Unlimited provided financial support when the program began, and members assisted with initial fin clipping efforts (for identification purposes).

Although catches have been reported, the largest of which was nine pounds and twenty – eight inches long, this widely publicized program has not resulted in as many catches as had been anticipated. It is now understood that the stocked trout do not return in large schools, but rather more individually or in small groups, and the amount of time spent in the lower brackish water is highly variable, with some fish returning after several months while others may return several years later. All of these factors play a role in the number of sea-runs caught by anglers. To date, there have been more than 80 catches of sea-run trout ranging in size from 2 - 8 pounds. Conversations with experienced anglers indicate that a large number of sea-run trout captures are not being reported, so as not to draw attention to this fishery.

Opportunity – Continue to publicize the program through articles, updates and news releases.

Opportunity – Visibly tag a proportion of the brown trout stocked to encourage reporting.

Opportunity – Institute a lottery or reward system to encourage reports of catches.

There is currently a lack of information on the potential for creating sea – run trout populations in New Jersey's coastal streams.

Opportunity – In addition to the Manasquan River explore the possibilities of stocking other waters such as Toms River and the Raritan River.

Opportunity – Continue to monitor these coastal waters for the presence of sea – run trout populations through angler reports and proven sampling methods.

Opportunity – Management goals, measurable objectives, and evaluation procedures need to be established for the Sea Run Brown Trout program.

Lake Trout Stocking Program

The criteria for maintaining a healthy, reproducing population of lake trout are deep and cold water, high dissolved oxygen, and a stable forage base. Only a few reservoirs in New Jersey offer lake trout suitable living conditions and potential spawning habitat. Lake trout fisheries have been established in suitable waters to provide anglers with an opportunity to fish for this salmonid species outside of its natural range. Round Valley Reservoir and Merrill Creek Reservoir have been stocked over a long period of time and maintain fishable lake trout populations. An angler fishing at Round Valley Reservoir in May, 2002 caught the current New Jersey state record for lake trout (32 pounds, 8 ounces).

Round Valley was stocked from 1977 to 1995 with a total of 82,139 fish. Natural reproduction was documented in 1985, and in 1995 stocking was discontinued after it was determined that natural reproduction could support this popular fishery. Merrill Creek Reservoir has been stocked annually with lake trout since 1988. However, annual fish surveys conducted since then have not documented reproduction, consequently lake trout continue to be stocked annually. More than 60,000 lakers have been stocked in this reservoir. Surplus fish have also been stocked in Lake Hopatcong, Swartswood Lake, and Lake Wawayanda. These waterbodies do not meet all the criteria necessary to sustain a good population of lake trout, hence it was not surprising that these stockings failed to produce a measurable fishery. Additional surpluses have also been given to the Pennsylvania Fish and Boat Commission in support of their programs.

More recently, since November of 2004, lake trout have been annually stocked in Monksville Reservoir, in response to a noticeable decline in the brown and rainbow trout fishery at the reservoir. The decline was attributed to heavy predation on trout by other introduced species such as walleye and muskellunge. When brown and rainbow trout stocking was discontinued after 2004, lake trout stocking was initiated in hopes that this salmonid might inhabit deeper water than the previously stocked salmonid species, and interact less frequently with other top predator fish species. It is too soon to gauge the success of these introductions.

Opportunity – Identify additional opportunities for the stocking of lake trout within the state.

Miscellaneous Salmonid Stockings

Opportunity – Investigate opportunities for stocking additional species or hybrids of trout to provide additional unique fishing opportunities within the state.

Surplus brook, brown and rainbow fingerlings

Overproduction of cultured trout is a necessary safeguard against unforeseen problems that can and do occur under intensive culture conditions in order to consistently meet the targeted quota necessary to implement current DFW stocking programs. At predictable times of the year the Pequest hatchery has excess trout which must be removed from the production cycle in order to ensure that the production capacity of the hatchery is not exceeded. This overproduction of trout can be broken down into three categories:

1) Spring Fingerlings (3-4" average size)
   Midway through the spring stocking season the hatchery begins the process of sorting fingerlings and setting them up in raceways for the following spring. The excess fingerlings resulting from this sorting procedure are available for stocking by May.

2) Spring Catchables (10.5" average size)
   Near the end of the spring stocking season, catchable trout in excess of the 575,000 baseline quota are available for stocking. These trout are kept in reserve until weeks 6 & 7, as a safeguard against unforeseen problems that may arise early on in the spring stocking program.

3) Fall Sub-catchables (5 – 7" average size)
   Early in the fall the sorting process is again conducted, resulting in excess trout (termed "surplus") which are typically stocked the third week of the fall stocking period.

The success of fingerling stockings has been studied (in other states) and found not typically necessary or successful in developing a good standing stock of trout. Except in certain situations, this is believed to be the case in New Jersey waters. Ideally the stocking of fingerlings should be reserved for those situations where there is a high probability of success. In the past, requests by regional fisheries biologists for fingerling trout have been limited to fingerling rainbows for newly constructed reservoirs (during the first year they were filled). Traditionally the overproduction fingerlings have been stocked primarily in nearby trout maintenance rivers and lakes, using the philosophy "it may not help, but it can't hurt." In 1993, the Bureau of Freshwater Fisheries developed a stocking plan for the use of hatchery surplus fish. The current version of this stocking plan can be found in Appendix F.

Private Stockings

Each year in addition to waters stocked with trout by the DFW there are also a number of stockings by private organizations and individuals. The waters stocked may be publicly or privately owned. The stocking of fish or fish eggs in any waterbody having an inlet or an outlet requires a stocking permit issued by the DFW of Fish and Wildlife's Bureau of Freshwater Fisheries. The purpose of the permit is to prevent the stocking of exotic, harmful species (carp, goldfish etc.) and to have some assurance that the source of the fish is from a hatchery that does not have a history of particular diseases of concern to fisheries managers. Applications are reviewed by regional biologists and are issued out of the Lebanon Field Office.

Delaware River Anadromous Salmonid

Prior to the development of the "pollution block" in the middle Delaware River, 1871 into the 1880's, the Fish Commissions of New Jersey and Pennsylvania undertook efforts towards establishing Atlantic salmon in the Delaware Basin. Atlantic salmon fry were planted in the main stem Delaware River and two major tributaries, the Pequest and Musconetcong Rivers. In 1874, fish were seen at the Delaware Water Gap and an eight-inch specimen was reported caught in the Musconetcong River. The following year, the reports indicate that small salmon were commonly taken in the Delaware and Musconetcong Rivers, and in 1876 a "large number" were reported caught in the Pequest River. By 1877 salmon were apparently returning to spawn. Delaware Bay shad fishermen caught 8 to 20 pound salmon and other large salmon were seen throughout the length of the river that year. Yet in 1878 reports were almost non-existent and in the following years none were received. Low water, high water temperatures and pollution were the reasons given for the abrupt decline of returning fish and lack of spawning success. Stocking was abandoned in 1882. Pennsylvania resumed stocking in 1889 and in 1895 many large salmon were taken by commercial fishermen throughout the river. Around 1966 Pennsylvania stocked a small number of coho salmon in the Brandywine Creek with evidence that some migrated to sea, returned and were caught. In addition, a private organization reared and stocked steelhead trout near Easton, PA into either the Delaware or Lehigh Rivers with no evidence of success.

A feasibility study was conducted, in 1983, for the State of New Jersey, DFW of Fish, Game and Wildlife, by an independent consulting firm, Normandeau Associates (Normandeau, 1983). The study found it practical to consider three species of salmonids (steelhead trout, coho and chinook salmon) for introduction into the Delaware River.

The DFW submitted a proposal to undertake an experimental five year stocking and five year monitoring study to introduce Chinook Salmon and/or Steelhead trout in the Delaware River. In order to obtain federal funding for the study the DFW was required to prepare and complete an Environmental Impact Statement. The independent consulting firm, Versar, was contracted and completed the Draft Environmental Impact Statement (DEIS) in February 1992 (Versar, 1991). As required, public meetings were held and comments were received on the DEIS.

Approximately 125 people attended the two public meetings, and 42 persons provided oral and/or written comments. 41 people from the general public spoke against the Proposed Action, and only one was in favor. At the end of the public comment period a total of 173 written comments were submitted. Written comments on the DEIS yielded

15 in favor and 100 opposed. However, this did not include two petitions with a total of 122 signatures in favor of the stocking of chinook salmon and another petition containing 500 signatures supporting the introduction of steelhead.

Comments on the DEIS included but were not limited to:

- A source of eggs, which fit both run timing and disease status criteria, may not exist for chinook and coho salmon.
- Introduction of any Pacific salmon conflicts with National Park Service management plans for two parks on the Upper Delaware River
- Potential environmental impacts on Federally endangered mussel populations in the Neversink River
- Future FWS funding for Pacific salmon introduction is improbable because of Executive Order 11987 policy and the recent intentional introductions policy options prepared as part of the Non-indigenous Aquatic Nuisance Prevention and Control Act of 1990.
- Concern that although a limited experimental program may have negligible environmental impacts, a full scale program may and these were not addressed in the DEIS which only addressed the limited experimental program.
- Lack of support from other members of the Delaware River Fish and Wildlife Management Cooperative.

On July 2, 1992 the DFW announced a decision not to pursue their proposal to stock Pacific salmon in the Delaware River for the following reasons:

- Evaluation of the findings of the DEIS.
- Consideration of public comment on the proposal
- A salmon program would detract from a more immediate priority, promotion of a warmwater fisheries program
- A salmon program would require significant investment of resources over an extended period of time with no guarantee of success

Since the DFW withdrew its proposal to stock Pacific salmon in the Delaware River a Final EIS was never drafted on the proposed stocking. However, the proceedings and comments on the DEIS are documented in Notice of Withdrawal of Pacific Salmonid Stocking Proposal for the Delaware River Basin prepared by Versar in November of 1992 (Versar 1992).

Float stocking

When stream conditions permit, float stocking is another tool used to provide a more equitable distribution of trout through trout stocked stretches. It is useful in areas where stocking points are limited by an insufficient number of access areas or on streams where long stretches receive considerable fishing pressure to increase dispersal of anglers. Streams are not typically float stocked during the pre-season period due to high stream flows typically experienced in mid-March and since the majority of these waters are closed to fishing during that time period. A small fish box is loaded and "floated" behind a small pram. The box is typically refilled at specific access areas along the stretch. In remote park areas, trout may also be distributed by park rangers using all terrain vehicles equipped with wooden tanks and oxygen bottles. Waters that are currently float stocked include:

Waterbody	Stretch	Personnel
N/Br Raritan River	Rt. 22 to Old York Rd. bridge	DFW staff
S/Br Raritan River	Neshanic Station to Rt. 606 bridge	DFW staff
Ramapo River	Audubon property to Lenape Ln. bridge	WCC Volunteers
Pompton River	Newark-Pompton Turnpike to Rt. 23 bridge	DFW staff
Passaic River	Lord Sterling Rd. bridge to S. Maple Ave.	DFW staff
Paulinskill River	Rt. 610 bridge to Sharp's Farm (off Rt. 521)	DFW staff
Round Valley Reservoir	---	WCC Volunteers
Swartswood Lake	---	State Park personnel
Lake Wawayanda	---	State Park personnel
Lake Aeroflex	---	State Park personnel
Merrill Creek Reservoir	---	Reservoir staff
White Lake	---	WCC Volunteers
Toms River	Trout Conservation Area	WCC Volunteers
Pequest River*	Trout Conservation Area	DFW staff
Musconetcong River*	Point Mountain TCA	Hunterdon County Park & WCC Volunteers
Flatbrook *	Roy bridge to Walpack bridge	WCC Volunteers
* Not float stocked but trout distributed through additional bucket and net stockings		

Stocking Contingency Plans

Occasionally waters are unable to accommodate all or part of their trout allocation because of unsuitable conditions. These problems are usually the result of weather-related conditions that may occur on short notice, or become apparent as the stocking season approaches or progresses. The Pequest Trout Hatchery does not have the capacity retain trout past the intended stocking period. Therefore, when unforeseen conditions arise that impact the distribution of trout, a contingency plan must be developed to ensure the trout are distributed in a timely fashion. Program adjustments, tailored to the specific situation, must be made quickly to ensure minimal disruption to the stocking program and hatchery production. Briefly described below are several problems that have occurred in the past, and the program adjustments that were made.

> <u>Drought –</u> Lakes and larger rivers are usually buffered from the immediate effects of extended periods of low rainfall. However, drought conditions can impact streams and low flow conditions may result in conditions that are marginal or unsuitable for trout. Small streams tend to be most affected by drought, however, larger streams can also be affected. To the extent possible, scheduling changes are made, , to ensure waters receive their established trout allocations. In the spring of 2002, when drought conditions prevailed, the pre-season stocking schedule was rearranged so small streams were stocking just prior to opening day.

In the fall of 2005, stocking was cancelled on one stream, curtailed on others, and trout (partial or full allocations) were redirected to other waters.

Floods – A severe rain event can cause high flow conditions in streams rendering them temporarily unsuitable for stocking. If necessary, stream stocking is re-scheduled (later in the week, if possible) after the floodwaters subside. Flooding generally does not create a stocking problem on ponds or lakes unless a dam breach occurs. If a significant portion of a lake's surface is lost, rendering the lake unsuitable for trout or for fishing, then the trout will be re-directed to other waters.

Freezing weather – Hatchery trucks are equipped with ice picks, to use as needed to create open water. Lakes in northern portion of the state that are frozen are re-scheduled if possible.

Lake restorations – Periodically, ponds and lakes undergoing dredging or rehabilitation projects are drained and projects may not be completed prior to the onset of trout stocking. Trout allocated for these waters are re-distributed to the remaining trout-stocked waters.

Allocation Methodology for Cultured Trout

Overview

Considerable effort was expended in developing a methodology to allocate cultured trout that was both resource and user-based, yet maintained existing, desirable allocation patterns. In 1990, following public input on the new "Trout Stocking Improvement Plan," (which included the allocation methodology and several regulatory changes) the Fish and Game Council approved the methodology and regulatory changes. The allocation methodology uses a combination of biological, physical, and social factors to equitable allocate trout over a 10-week period to all trout-stocked waters. A computerized database containing data for each stream, lake, and pond is used in conjunction with formulae to calculate individual weekly allotments. The database is annually reviewed and updated by biologists, who receive input from a variety of sources.

Background

Prior to 1990 the statewide allocation of trout to nearly 200 waters was based upon an entrenched tradition that relied heavily upon political boundaries. The trout-stocked waters in each of the state's 21 counties had an assigned quantity of trout. Each year these "quotas" would be reviewed by members of the Fish and Game Council who, in consultation with county representatives from the NJ State Federation of Sportsmen, had the discretionary power to allocate and redirect spring-stocked trout. If waters or stocking points were added or dropped from a particular county, the trout would typically be redistributed among the remaining trout-stocked waters within that county. In the absence of defined allocation guidelines, haggling for trout inevitably occurred and over time resulted in noticeable inequities that were difficult to change. Variable production and quality of trout reared at the aging Hackettstown Hatchery further complicated this annual allocation process. When the Pequest Trout Hatchery became operational in the mid-1980's, the production of brook, brown, and rainbow trout shifted from the Hackettstown Hatchery to Pequest. The modern facility at Pequest provided New Jersey anglers with a dependable supply of quality, catchable-sized trout. In response to a more stable supply of cultured trout, efforts to develop a means to more equitably distribute trout statewide intensified.

Efforts to devise a trout stocking formula to correct deficiencies in the apportioning of trout in New Jersey began as early as the 1970's with a review of the stocking procedures developed by other states. Those procedures generally included a variety of physical, biological, and social factors that were used in conjunction with management objectives and formulas to derive waterbody allocations. Some factors that were common to both streams and lakes included size, suitability to support trout, and social factors (human population density and recreational potential). Stream procedures tended to be more complex by relying upon additional physical and biological stream characteristics (i.e. trout biomass, food supply, pool depth, shelter, food availability, and vegetated stream margin). Each component used was typically assigned a value or rating and established stocking rates (based upon the sizes of cultured trout available for stocking) were applied in conjunction with a formula to derive the number to be stocked.

The early attempts to develop trout stocking procedures for New Jersey focused on the collection of data similar to what was in use by other states. Waterbody size and capacity to hold trout were integral components for both streams and lakes. Additional stream data was collected and included flow, width, and a habitat component (percent of water over one foot, and percent cover). Because of the complexity of the stream formula, coupled with difficulties associated with data manipulation and computations (without benefit of personal computers) the development of a formula languished.

Interest and effort to develop a formula resumed in the 1980's, coinciding with the construction of a new trout hatchery and three major water-supply reservoirs. Formal allocation procedures were needed that would allow the DFW to take advantage of the anticipated stable supply of cultured trout, and facilitate allocations of trout to new waters. The following concepts were central to the development of an allocation methodology:

(1) Trout allocations would be based upon an established, baseline number of catchable-size trout available each spring from the Pequest Trout Hatchery.
(2) Trout would be equitably allocated, using procedures that relied upon a combination of resource and user characteristics.
(3) Trout allocations would be adjusted annually as a result of program and resource/user changes, thereby providing incentives to improve existing conditions (such as access).

The difficult task of data manipulation and testing of formula eased considerably when personal computers and database software became readily available in the mid 1980's. Additional data for streams and lakes was collected with the assistance of staff fisheries biologists and conservation officers. Stream variables that were evaluated included flow, stream length, width, trout supporting capability, percent pool/cover, vegetative cover, and stocking frequency. Lake variables included surface area, trout supporting capability, angler access, human population density, and proximity to other trout-stocked waters. A variety of formulae and combinations of variables and criteria were evaluated and a suitable allocation methodology was tentatively selected that utilized some of the variables that were investigated. In 1989 a public forum was held to solicit input on the "Trout Stocking Improvement Plan" which included the allocation methodology and several tentative regulatory changes (creation of the *Wild Trout Stream and Trout Conservation Area* regulations). This plan was accepted by NJ Fish and Game Council (with modifications to the regulations) and implemented by the DFW in 1990.

Database Variables

The trout allocation methodology utilizes three factors – physical, biological and social – to characterize the resource and recreational use of the resource. Variables are assigned to each of these factors and are used in a formula to derive the weekly trout allocations for individual waters. Variables for the physical and social factors differ for streams and lakes, while the biological factor relies upon one variable common to both types of waters. The variables associated with each factor are described below and summarized in Table 6 (streams) and Table 7 (lakes).

Physical Factor

The physical size of a trout-stocked water plays a major role in determining the number of trout allocated. Because of differences in the character of streams and lakes (flowing versus standing water) different variables were used to describe each type. Data collected for the physical criteria were used to develop separate size categories for streams and lakes/ponds.

Streams The physical factor for streams is characterized using two variables - flow and length. Flow and length variables provide a reasonable assessment of available space for cultured trout and are relatively easy to obtain compared to more precise habitat assessments (pool features, cover, etc.).

- Flow Streams are assigned to one of the following six size categories (A-F) based upon the mean stream flow for March and April (obtained from USGS gauging stations, if available, or through field measurement).
  - (A) 100 cfs or more,
  - (B) 40 – 99 cfs,
  - (C) 20 – 39 cfs,
  - (D) 8 – 19 cfs,
  - (E) 4 – 8 cfs, and
  - (F) 1-3 cfs

  When indicated by flow data, major streams were divided into sections and assigned to appropriate size categories. Stream width (measured in the field) may be used as an aid in determining the appropriate size category.
- Length Length is used to linearly quantify the amount of stockable water. The miles of stream that are stocked are determined by assigning 0.5 miles to each stocking point (0.25 mile upstream and downstream), discounting overlap between stocking points and in-stream physical barriers to upstream fish movement (i.e. dams).

Lakes & Ponds

- Surface area Lakes are assigned to one of the following three size categories:
  - (A) 1- 5 acres
  - (B) 6 – 30 acres, and
  - (C) 31 acres or more.

Biological Factor

The ability to support trout and maintain a trout fishery is the biological criterion used for all trout-stocked waters. The fishery is characterized as either seasonal or year round. If a trout-stocked water does not support (or sporadically supports) trout year round, the trout fishery is termed seasonal. In a seasonal trout fishery, spring-stocked trout that are not caught within the first few months following release generally do not survive through the summer months because of high water temperatures. A year round designation indicates that the water supports trout year round and is managed to provide a year round fishery. Summer water temperatures, in combination with dissolved oxygen, do not exceed trout tolerances and trout that are not caught within the first few months consistently survive ("holdover") through the summer and may grow appreciably (particularly in lakes). Angling for trout is a year round activity on these trout-stocked waters. When differences in trout supporting capabilities occurred over the length of a stream, the stream was further divided into sections to accommodate for these changes.

Social Factor

The social factor involves a multi-faceted characterization of the opportunity to fish for trout. As with the physical factor, different variables are used for streams and lakes since the conditions, which enhance or limit angling opportunities, vary.

Streams A combination of three variables (ownership, availability of parking, and angler interest) is used to characterize the recreational use potential (RUP) on a scale of 1 (lowest) to 5 (highest).

- Ownership In New Jersey the owner(s) of the stream bank and stream bottom controls foot access to the stream. Trout are stocked in publicly and privately owned streams provided the owner allows unrestricted public access. Publicly owned streams generally have a higher profile with the angling public than privately owned waters and tend to be more heavily fished. The amount of stream that is in public ownership is expressed as a percent of the total distance stocked.
- Parking The availability of parking for stream anglers can be quite variable and may be limiting, particularly on the opening day of the trout season. Anglers may be relegated to parking some distance away or on road shoulders, or roadside pull-offs or parking lots may be in close proximity. Parking is rated as good adequate, or poor.
- Interest Angler interest is also rated (high, moderate, low) as a means to acknowledge highly popular waters, however, it is acknowledged that stocking densities may play a role in the level of interest.

Lakes & Ponds Three variables (human population density, angler access, and opportunity) were used to characterize the social factor for lakes.

- Human population density Trout are stocked in lakes in and near urban areas to provide a readily accessible, seasonal fishery to a potentially large number of people. The population density of the municipality having a trout-stocked water was used as an indication of the extent of this opportunity.
- Access Trout-stocked lakes are, for the most part, publicly owned and have ample parking for recreationalists. Consequently, parking is not considered a factor that limits participation. However, the percentage of shoreline that can be fished and the opportunity to boat (on lakes over 10 acres) is quantified as a means of rating accessibility.
- Proximity of trout-stocked waters Trout-stocked lakes and ponds not having (or having few) trout-stocked waters nearby provide not only a local, but also a more regional opportunity trout fishing opportunity. The number of trout-

stocked waters within a ten-mile radius of a trout-stocked lake is determined and used as an indication of trout fishing availability in the area.

Database

A computerized database is used to manage the data associated with the physical, biological and social factors related to each trout-stocked water. The database is annually reviewed and updated prior to calculating the spring allocations by the regional fishery biologists, who receive input from conservation officers, stocking crews, the NJ Fish & Game Council, and the general public. Feedback on resource changes is strongly encouraged so those factors affecting the individual allocations for waters can be appropriately adjusted. The data is organized and manipulated using DBase III+ software. The database used to calculate the 2003 spring allocations appears in Appendix G.

Allocation Procedure

A three-step process (Table 8) is used to calculate individual weekly allocations for the ten-week spring stocking period using the trout-stocked waters database. First, the pre-season and in-season allocations for streams are approximated using the database in conjunction with established stocking rates and formulae. An individual allocation that falls below 100 trout is increased to 100 to make the stocking effort worthwhile (in terms of manpower). Next, the same is done for lakes and ponds. The third step finalizes the nearly 1,000 individual allocations generated by the first two steps. Programs written using DBase III+ software are used in this three-step process. The procedures used in the three-step process are more fully explained below.

<u>Step 1 Calculation of weekly individual unadjusted allocations for streams</u>
A stream's initial allocation is first computed for the pre-season period by multiplying the stocking rate (number of trout per mile) established for the stream's size category by the stream mileage. The resulting product is then adjusted upward or downward according to the variables associated with the biological and social factors. Streams that provide a year round fishery are rewarded with a 10 percent increase in trout. If the recreational use potential is excellent or outstanding then the initial allocation is further increased by 10 or 20 percent. If it is fair or poor then a 10 or 20 percent decrease in the allocation occurs. These incremental adjustments to the initial allocation (which also affect the in-season allocations) are subject to change annually when warranted by changes in the field. This provides an incentive to improve existing situations as well as recognizing when conditions have deteriorated. The unadjusted in-season stocking allocations are based upon the pre-season allocation and determined using the stocking frequency chart for streams. The number of trout per allocation, and the number of in-season allocations, generally decreases as the season progresses. This stocking pattern recognizes that angler effort decreases after opening day waters and fewer trout are stocked as the season progresses.

Step 2 Calculation of weekly individual unadjusted allocations for ponds/lakes

A pond/lake's initial allocation is first computed for the pre-season period using a sliding scale stocking formula. This was deemed necessary because if large lakes were stocked at the same rate as small lakes and ponds then the large lakes would absorb a considerable portion of the hatchery production. The sliding scale stocking rate applies a 75 trout per acre stocking rate to the first five acres of an impoundment. The next 25 acres are stocked at a reduced rate (five trout per acre), and any acres in excess of 30 are stocked at a rate of one per acre. The resulting allocation figure is then adjusted upward or downward according to the variables associated with the biological and social factors. As with streams, lakes that provide a year round fishery are rewarded with a 10 percent increase in trout. If the human population density is 1,000 people per square mile or greater, then the initial allocation is increased by 10 or 20 percent. Angler access limitations, in terms of shoreline and boating access, result in allocation reductions of 20 or 40 percent. If few or no trout angling opportunities are available within ten miles then the allocation is boosted by 10 or 30 percent. These incremental adjustments also affect the in-season allocations) and are subject to change annually when warranted by changes in the field. This provides an incentive to improve existing situations as well as recognizing when conditions have changed. The unadjusted in-season stocking allocations are based upon the pre-season allocation and determined using the stocking frequency chart for lakes. The number of trout per allocation decreases in-season except on those waters having year round trout fisheries. Certain waters have been designated to receive only one stocking (pre-season) are not assigned in-season allocations. When the pond/lake formula was first developed it was necessary to make a minor adjustment to all the lake allocations (the 0.95 multiplier) in order to balance the stream and lake allocations to achieve the spring baseline.

Step 3 Calculation of final individual allocations for streams, lakes, and ponds

First the undajusted allocations calculated in Steps 1 and 2 are summed. When this total is less than or greater than the established spring baseline of 575,00 trout, all allocations must be proportionally adjusted using a calculated constant (C) in order to achieve the baseline figure (Table 9). This unadjusted total has consistently exceeded the spring baseline and allocations have been adjusted downward one or two percent since inception. The final procedure involves rounding all the allocations to the nearest multiple of ten, to simplify the loading of fish onto the hatchery trucks. This last procedure inevitably results in a final total that differs from the target baseline figure by as much as several hundred trout, but is an acceptable margin of error.

Opportunity – Antiquated software (Dbase III+) is used to maintain the database and derive the spring trout allocations and conversion to a modern software set-up is desirable.

TABLE 6.— Factors and Associated Criteria used to Determine Spring Trout Allocations for New Jersey Trout-Stocked Streams.

Physical

Flow - Each stream is assigned to a size category (A-F) based on stream discharge (flow) and width. Discharge is the mean discharge in cfs (ft^3/sec) for April – May (USGS gauging station or field measurement data used). Width is the mean width midway in the stream reach.

A	discharge: ≥ 100 cfs	width: 40 – 150 ft
B	discharge: 40 - 99 cfs	width: 19 – 68 ft
C	discharge: 20 - 39 cfs	width: 15 – 54 ft
D	discharge: 8 – 19 cfs	width: 10 – 33 ft
E	discharge: 4 -7 cfs	width: 7 – 30 ft
F	discharge: 1 – 3 cfs	width: 5 – 21 ft

Length – Each stocking point is assigned a distance of 0.5 miles (¼ mile above and below each point). Mileage overlap between stocking points (those within 0.5 miles of each other) is not counted and mileage assigned to a stocking point is reduced if a barrier restricts fish movement (e.g. dam). The sum of the distances assigned to the stocking points for an individual stream equals the stream mileage. If a stream section is regulated as a Year Round Trout Conservation Area, the mileage for the special regulation section is noted.

Biological

Fishery Type The ability of a water to support trout determines the fishery type.

Seasonal (S) - Trout survival beyond the spring is not expected (or survival through the summer is intermittent) and the trout are not expected to grow significantly before they are caught (put-and-take).
Year-round (Y) - Trout survival year-round is expected and the trout may or may not grow significantly before they are caught Immediate harvest (put-and-take) and/or delayed harvest (put-grow-take) is possible.

Social

Recreational Use Potential (RUP) Three variables (parking availability, land ownership, angler interest) are used in combination to rate the recreational use potential of a stream on a scale of to 5 (high) to 1 (low).

Ownership – The percentage of stocked water in public ownership (public ownership may be on only one side of the stream, not both).
Parking – Parking availability is rated Good (G), Adequate (A), or Poor (P).
Interest – Angler interest is rated High (H), Moderate (M), and Low (L).

RUP	OWN	PARK	INT
5	50-100	G	H
4	15-49		
	1-14		
	0		

RUP	OWN	PARK	INT
4	50-100	A	H
	15-49		
	1-14		
	0		

RUP	OWN	PARK	INT
4	50-100	P	H
3	15-49		
	1-14		
	0		

RUP	OWN	PARK	INT
4	50-100	G	M
	15-49		
	1-14		
3	0		

RUP	OWN	PARK	INT
4	50-100	A	M
	15-49		
3	1-14		
	0		

RUP	OWN	PARK	INT
4	50-100	P	M
3	15-49		
	1-14		
2	0		

RUP	OWN	PARK	INT
4	50-100	G	L
3	15-49		
	1-14		
	0		

RUP	OWN	PARK	INT
3	50-100	A	L
	15-49		
2	1-14		
	0		

RUP	OWN	PARK	INT
3	50-100	P	L
2	15-49		
	1-14		
1	0		

TABLE 7.— Factors and Associated Criteria used to Determine Spring Trout Allocations for New Jersey Trout-Stocked Lakes and Ponds.

<table>
<tr><td rowspan="3">Physical</td><td rowspan="3"><u>Surface area</u> Each lake/pond is assigned to a size category (A-C) based upon surface area (acres)</td><td>G</td><td>0 – 5 acres</td></tr>
<tr><td>H</td><td>6 – 30 acres</td></tr>
<tr><td>I</td><td>> 30 acres</td></tr>
<tr><td>Biological</td><td colspan="3"><u>Fishery Type</u> The ability of a water to support trout determines the fishery type.
<u>Seasonal (S)</u> - Trout survival beyond the spring is not expected (or survival through the summer is intermittent) and the trout are not expected to grow significantly before they are caught (put-and-take).
<u>Year-round (Y)</u> - Trout survival year-round is expected and the trout may or may not grow significantly before they are caught Immediate harvest (put-and-take) and/or delayed harvest (put-grow-take) is possible.</td></tr>
<tr><td rowspan="3">Social</td><td colspan="3"><u>Human population density</u> - The population density of the municipality bordering the lake is obtained from recent government census figures and expressed as the number of people per square mile. If more than one municipality borders the lake then the weighted mean is used.</td></tr>
<tr><td colspan="3"><u>Angler access</u> - Accessibility is evaluated for shoreline and boat fishing. Shoreline access is limiting (“S”) if less than 25% of the shoreline is accessible to the general public. For lakes over 10 acres, boating access is considered limiting (“B”) if a boat launch (cartop or ramp) is absent or if boating is not allowed.</td></tr>
<tr><td colspan="3"><u>Angling opportunity (proximity of trout stocked waters)</u> - For each trout-stocked lake or pond the number of trout stocked waters within a 10-mile radius is counted.</td></tr>
</table>

TABLE 8.— Calculation of individual trout allocations – a 3 step process.

STEP 1 of 3

Calculate the Unadjusted Weekly Allocations for Each Stream Using the Following Formula:

Q * M * [1 + F + R] * K

Stocking Rate (Q)	Category A	Q = 485 trout/mile
	Category B	Q = 395 trout/mile
	Category C	Q = 260 trout/mile
	Category D	Q = 210 trout/mile
	Categories E & F	Q = 135 trout/mile
Mileage (M)	-	M = number of miles stocked[1]
Fishery Type (F)	Seasonal	F = 0.0 (no change)
	Year-round	F = 0.1 (10% increase)
Recreational Potential (R)	RP = 5 (outstanding)	R = 0.2 (20% increase)
	RP = 4 (excellent)	R = 0.1 (10% increase)
	RP = 3 (good)	R = 0.0 (no change)
	RP = 2 (fair)	R = –0.1 (10% decrease)
	RP = 1 (poor)	R = –0.2 (20% decrease)
Frequency Factor (K)	Consult table below for value assigned to K	

Stocking Frequency and Value Assigned to K for Streams

Stream Characteristics		**Weekly stocking frequency and value assigned to K**							
			In-season stocking period [1]						
Size Category	***Conditions*** *(mutually exclusive and applied in order of appearance)*	***Pre-Season***	*Week 1*	*Week 2*	*Week 3*	*Week 4*	*Week 5*	*Week 6*	*Week 7*
A, B, & C	Closed in-season stocking dates	1.0	0.45	0.4	0.4	0.4	0.4	0.25	0.25
A & B	No closed in-season stocking dates; year round fishery or D&R Feeder Canal	1.0	0	0.4	0.4	0.4	0.4	0.25	0.25
	No closed in-season stocking dates; seasonal fishery	1.0	0	0.4	0.4	0.4	0.4	0	0
C	No closed in-season stocking dates; year round fishery	1.0	0	0.4	0.4	0.4	0.4	0.25	0
	No closed in-season stocking dates; seasonal fishery	1.0	0	0.4	0.4	0.4	0.4	0	0
D	RUP = 3, 4, or 5 — Year-round fishery	1.0	0	0.4	0.4	0.4	0.4	0.25	
	RUP = 3, 4, or 5 — Seasonal fishery	1.0	0	0.4	0.4	0.4	0	0	0
	RUP = 1 or 2	1.0	0	0.4	0	0.4	0	0	0
E	year round fishery	1.0	0	1.0	0	1.0	0	0	0
	seasonal fishery	1.0	0	1.0	1.0	0	0	0	0
F	None (all inclusive)	1.0	0	0	1.0	0	0	0	0

[1] A Year Round Trout Conservation Area (YTCA) stretch is not stocked as frequently as the rest of the stream. Prior to 2004, a YTCA stretch was stocked during the pre-season period and two times during the in-season stocking period (Weeks 3 & 7). In 2004, another in-season stocking was added (Week 6). If the mileage for a YTCA section is included in the overall stream mileage, then YTCA mileage must be subtracted from the stream mileage before calculating the stream's in-season allotments for those weeks when the YTCA is not stocked.

TABLE 8 (continued).— Calculation of individual trout allocations – a 3 step process.

STEP 2 of 3

Calculate the Unadjusted Weekly Allocations for Each Pond & Lake Using the Following Formula:

Q * [1 + F + D + L + P] * 0.95 * K

Stocking Rate Subformula (Q)	Surface area (A) is 1 to 5 acres	Q = [75 * A]
	Surface area (A) is 6 to 30 acres	Q = [5 * (A – 5)] + 375
	Surface area (A) is over 30 acres	Q = [1 * (A – 30)] + 500
Fishery Type (F)	seasonal	F = 0.0 (no change)
	year-round	F = 0.1 (10% increase)
Human Population Density (D)	at least 5,000 people/sq. mile	D = 0.2 (20% increase)
	1,000 – 4,999 people/sq. mile	D = 0.1 (10% increase)
	less than 1,000 people/sq. mile	D = 0.0 (no change)
Angler Access (L)	lake > 10 acres and no boating access	L = –0.2 (20% decrease)
	shoreline < 25% accessible	L = –0.2 (20% decrease)
	both shoreline & boat access limiting	L = –0.4 (40% decrease)
Angling Opportunity (P)	No TSW within a 10 mile radius	P = 0.3 (30% increase)
	1 – 5 TSW within a 10 mile radius	P = 0.1 (10% increase)
	more than 5 TSW within a 10 mile radius	P = 0.0 (no change)
Frequency Factor (K)	Consult table below for value assigned to K	

Stocking Frequency and Value Assigned to K for Ponds/Lakes

Pond/Lake Characteristics		**Weekly stocking frequency and value assigned to K**							
Fishery Type	***Conditions (mutually exclusive and applied in order of appearance)***	***Pre-Season***	***In-season stocking period [1]***						
			Week 1	***Week 2***	***Week 3***	***Week 4***	***Week 5***	***Week 6***	***Week 7***
Year Round	None (all inclusive)	1.0	0	1.0	0	1.0	0	1.0	0
Seasonal[1]	Stocked pre-season only	1.0	0	0	0	0	0	0	0
	Human population density 5,000+ people/ sq. mile **OR** no trout-stocked waters within a 10 mile radius	1.0	0	0.75	0.75	0.75	0.75	0	0
	All others	1.0	0	0.75	0.75	0.75	0	0	0

[1] In 2005 the in-season stocking schedule for these waters was shifted one week earlier (i.e. in-season stockings commenced Week 1 and ended on Week 3 or 4).

TABLE 8 (continued) — Calculation of individual trout allocations – a 3 step process.

	STEP 3 of 3 **Calculation of Final Allocations for Streams, Ponds, & Lakes**
A	Any individual allotments that are 1 - 99 are increased to 100.
B	Calculate the adjustment constant (C) to achieve the spring baseline by dividing the spring baseline by the sum of all the unadjusted pre-season and in-season stream and pond/lake allotments calculated in Steps 1 & 2
C	Multiply each unadjusted pre-season and in-season allotment by the adjustment constant (C) to obtain the adjusted pre-season and in-season allotments.
D	Obtain the final allotments by rounding each adjusted pre-season and in-season allotment to the nearest multiple of 10 and adjusting individual allotments that are 1 - 99 to 100.
E	Calculate the spring trout allocation for each waterbody by summing the rounded pre-season and in-season allotments. Note: Due to the rounding process the season total of all in-season and pre-season allotments may be slightly greater or less than the spring baseline.

TABLE 9.— Annual spring baseline and constant used to adjust individual raw pre-season and in-season trout allotments in order to achieve the spring baseline figure.

Year	Target spring baseline (number of trout)	Adjustment constant (C)
1990	560,000	0.99462
1991	575,000	0.98471
1992	575,000	0.98823
1993	575,000	0.98866
1994	575,000	0.98543
1995	575,000	0.98130
1996	575,000	0.98478
1997	575,000	0.97922
1998	575,000	0.98039
1999	575,000	0.97748
2000	575,000	0.97960
2001	575,000	0.97849
2002	575,000	0.98056
2003	575,000	0.97458

Fishing Regulations for Trout

Overview

The regulation of angling activity is an important tool used by resource managers to protect and enhance the fishery resource for the benefit users. Each year New Jersey's freshwater fishing regulations are adjusted based upon biological findings, changing conditions, and angler preferences. The state Fish and Game Council is responsible for proposing and adopting the Fish Code, a legal document that specifies the freshwater fishing regulations that anglers must follow while fishing. Regulations should not be overly complex and a recent survey indicated that 84% of New Jersey anglers found the freshwater fishing regulations to be clear and easy to understand. Conservation Officers enforce the fishing regulations by conducting patrols by vehicle, foot, or boat to detect or deter violations.

New Jersey's trout fishing regulations can be separated into a general regulation, that applies statewide to most waters, and special regulations that apply to specific waters. Each regulation is comprised of four components (seasons, creel limits, length limits, and gear restrictions) that vary by regulation type. Some regulations are predicated on traditions established long ago, while others reflect more recent changes in resources and angler attitudes. Although each trout regulation provides a different angling opportunity, the lack of measurable objectives hampers efforts to evaluate regulation success and need for change.

Regulatory Authority and Legal Process

The responsibility for regulating recreational and commercial fishing in New Jersey freshwaters rests with the DFW and the Fish and Game Council. The statutory and administrative codes for New Jersey's freshwater fishing regulations are found in N.J.S.A. 23:5-1.1 et seq. and N.J.A.C. 7:25-6.1 et seq. The administrative code is the legal document that is commonly referred to as the "Fish Code." The Fish and Game Council (successor to the Fish and Game Commission) was empowered by the Legislature in 1945 with the independent responsibility to adopt the Fish and Game Codes for the purpose of providing a system for the protection and conservation of fish and wildlife.

The Fish Code establishes the legal angling methods, seasons, size and catch limits, and defines the trout stocked waters for freshwater fishing in New Jersey. Regulations specific to trout fishing are generally found in N.J.A.C. 7:25-6.3 through 6.9. The opening day of trout season in New Jersey is traditionally the first or second Saturday in April. Every year this date is adjusted and all other dates that are dependent upon this date must also be changed. The list of trout-stocked waters is specified and most of these waters are closed to fishing during the three week period prior to opening day, when trout stocking commences. The number of times a trout-stocked water is stocked during the spring in-season period is specified. Details pertaining to special regulation trout fishing areas are specified.

Each year the Council reviews and revises the Fish Code based on biological findings, angler preferences and changing situations. Then, through an established legal process, the Council proposes the next year's Fish Code, solicits public comment, and officially adopts the proposal with or without changes. This annual process begins nearly one year before each Fish Code becomes effective. In December/January DFW fisheries biologists prepare recommendations that undergo internal peer and law enforcement review. Desirable changes, in the form of a preliminary proposal, are forwarded to the Director for approval and then given to members of the Fish and Game Council's Fish Committee for their review. At the Committee's meeting (February), refinements, if needed or requested, are made and the proposal is then submitted to the full council for review and approval at their March meeting. Upon Council approval the proposal is forwarded to the Department's Office of Legal Affairs for review. When released by this office, the proposal is submitted for publication in the New Jersey Register in June/July. The public is notified of the proposal and the date of the public hearing (scheduled at least 15 days into the public comment period) through public notices, press releases, the Statehouse bulletin board, and Department website. After a mandated 60-day public comment period, responses to comments received are prepared and sent through the Office of Legal Affairs to the Fish and Game Council. The Council reviews the public comments and then votes to adopt the proposal, with or without changes (September/October). The adopted proposal is returned to the Office of Legal Affairs, submitted for publication in the Register in December, and becomes effective by January 1st.

Enforcement of Fishing Regulations

The DFW's Bureau of Law Enforcement is charged with the responsibility of enforcing the regulations in the Fish Code (as well as the Game Code, marine regulations, and wildlife management area regulations). The administrative staff is headquartered in Trenton office and the field staff (conservation officers, their supervisors, and dispatchers) work out of three regional offices. Because they are uniformed employees, Conservation Officers are the DFW's most visible representatives. These officers and their volunteer deputies come into contact with thousands of citizens each year. As they conduct general patrols by four-wheel drive vehicles, foot, or boat, their presence helps detect or deter violations. In the field they educate and redirect the actions of wildlife users to ensure compliance with applicable regulations. Their inspections of persons hunting, fishing, and visiting wildlife management areas result in the issuance of thousands of summonses and written warnings. The public also has the opportunity to assist officers in the apprehension of violators by reporting illegal activities through the Operation Game Thief program.

Fishing Regulations[1]

The regulation of angling activity is an important fisheries management tool that involves balancing biological issues and problems with social and economic issues and desires. Regulations should be designed to meet established management goals through measurable objectives. Examples of measurable objectives include catch rates, harvest

[1] Note: General information presented was obtained primarily from Noble and Jones (1999).

rates, man-days of fishing, and angler satisfaction. Biological and ecological objectives focus on protecting fish populations from over exploitation (by limiting the harvest and distributing the catch among anglers), and enhancing them (quality or trophy fishery). Sociological objectives typically deal with angler expectations and satisfaction and may be used to divide the resource between users (i.e. "opening day," fishing with artificials vs. bait, etc.). Economic reasons are related to generating revenue through fees (licenses and stamps) to support fishery-related programs and generate statistics used to secure federal aid funding.

Regulations that limit the size and quantity of fish harvested by anglers are typically intended to reduce the rate of fishing mortality to allow growth of overexploited populations and/or distribute the catch among anglers. However, it should be noted that these types of regulations only restrict the harvest by individual anglers, not the overall harvest, and may result in an unintended outcome (Post et al. 2003). For example, the imposition of a more restrictive minimum size or daily creel regulation could potentially attract more anglers to the fishery, resulting in higher mortality rates (due to hooking) even if harvest were not allowed. The imposition of a regulation may have its greatest impact by altering participation (the number of anglers or angler hours) rather than restricting individual anglers.

Because the outcome of angler response to a regulatory change is not always predictable, regulations should have defined management goals that are supported with explicit objectives (e.g. to maintain a catch rate of one fish/hr and a population where 20% of the fish are over 177 mm (7 inches)). This enables fisheries managers to objectively evaluate the effectiveness of a regulation or a regulatory change and respond appropriately. When a regulatory change is being considered, efforts to inform and educate the public about basis for the change should be an integral part of the process. To achieve the broadest base of support for regulations, unnecessary or discriminatory restrictions should be avoided (Behnke 1987). Angling regulations that are easily understood and justifiable help maintain and strengthen agency credibility.

The effectiveness of fishing regulations can also be compromised by noncompliance. It is important that regulations not be overly complex as angler compliance may suffer if they are poorly understood. The majority (84%) of licensed anglers that fish in New Jersey feel that the freshwater fishing regulations are clear and easy to understand (Responsive Management 2003).

Regulations governing the recreational fishing activity of properly licensed anglers (or those entitled to fish without a license) can be separated into four broad categories:

Seasons - when an angler may fish or harvest trout

Creel limits - how many trout may be harvested

Length limits - what size of trout may be harvested

Gear restrictions - what type of fishing gear may be used

Seasons Seasonal closures may be imposed for biological reasons, to protect fish populations during a vulnerable period in their life cycle (i.e. spawning period), or for social reasons (i.e. to allow stocking before "Opening Day"). Regulations, such as harvest and gear restrictions, may also change seasonally to conserve fish. Through a variety of trout regulations, anglers today have opportunities to fish for trout year round in New Jersey. However, traditionally most anglers regard opening day (the first or second Saturday in April) as the start of the annual trout fishing season. During the three-week period preceding opening day, the DFW stocks trout in nearly all of the waters designated for trout stocking. For the most part these designated waters are closed to fishing during this "pre-season" closure period. Consequently, trout anglers eagerly anticipate opening day because it affords an opportunity to fish for stocked trout when they are most abundant and vulnerable to angling (because the trout have not been subjected to angling). Special regulation waters, such as trophy trout lakes and wild trout streams, have seasonal closures to protect spawning fish from harvest during spawning periods.

Creel Limits The daily harvest of trout by individuals is limited through imposition of creel limits, or daily limits. However, only a small proportion of anglers regularly harvests their limit. Consequently, the primarily purpose of creel limits is to distribute the trout resource among anglers, rather than protect the resource from over-harvest. A creel limit also provides anglers with a measurable means of judging their skill and success. The statewide creel limit for most New Jersey trout waters is six trout initially, from opening day in April through May, and four trout thereafter. Special regulation trout waters (trophy and holdover trout lakes, wild trout streams, conservation areas) have lower creel limits to promote "catch and release" fishing and/or to maintain a quality fishery. Delayed harvest regulations, designed to restrict harvest initially and later liberalize harvest when conditions may be more marginal for trout survival, have not been implemented in New Jersey.

Opportunity – Investigate the feasibility of reducing creel limits providing for delayed harvest of cultured trout.

Length Limits The most common length regulation is a minimum length requirement, where fish shorter than a specified length must be released upon capture. Minimum length limits have been historically used to prevent excessive harvest of a fish population, allow individual fish to grow to a desirable size, and, in some cases, protect fish until they reach spawning age and size. Growth rates and natural mortality should be considered when setting minimum length requirements. In New Jersey the statewide minimum length for trout is seven inches and was adopted in 1997 to protect naturally reproducing trout populations in streams that were not included under the Wild Trout Streams regulations. High minimum size limits are used to maintain a fishery for quality or trophy-sized fish (Trophy Trout Lakes), or to promote catch and release fishing (Trout Conservation Areas). A more specialized type of length limit employs a size range designed to either protect fish (slot limit) or allow harvest (inverse slot limit) within that range. This type of regulation was employed at Round Valley Reservoir for several years (to encourage harvest of an overabundant year class of lake trout), but currently there are no regulations of this type in effect for trout.

Gear Restrictions Restrictions on gear are imposed to decrease angling efficiency, reduce hooking mortality, and promote a diversity of fishing experiences (Noble and Jones 1999). Management strategies for salmonid fisheries often include special regulations for specific waters that restrict the use of rod and reel (fly vs. spinning), terminal tackle (artificials vs. bait, barbed vs. barbless hooks, single vs. treble hooks), and use of artificial scents. In New Jersey, management decisions and angler demand have resulted in the establishment of several special regulations for salmonids that involve gear restrictions (Wild Trout Streams, Trout Conservation Areas, and Fly Fishing Only Areas). The adoption, elimination, or modification of a special regulation that involves gear restrictions, and its imposition on specific waters, has often been a source of controversy.

The effect of terminal tackle (hooks, lures, and flies) and their effect on hooking mortality on salmonids have been widely studied. Studies have shown that hooking mortality of salmonids released following capture was higher for natural baits (30-50%) than flies and lures (5-10%) (Mongillo 1984). While mortality is greatest when fish are deeply hooked and vital organs are injured, studies have also shown that mortality resulting from bait fishing can be reduced (33-72%) if the line is cut on critically-hooked salmonids (Schill 1996). Mortality is also substantially higher when synthetic (scented) baits were used (22-32%) versus traditional artificial flies (3.9%) (Schisler and Bergersen 1996).

Consequently, the development of management strategies that depend upon the release of trout have traditionally relied upon regulations that impose restrictions on terminal tackle. However, some evidence suggests that fishing with bait need not be routinely prohibited in all special regulation waters (Carline et al. 1991). While a bait restriction may always be justifiable when the stated management goal is to provide the very best quality fishery possible (in terms of size structure or to prevent imminent collapse), if the management goal is simply to improve it above current conditions a bait restriction may not always be necessary (Schill 1996). Hook types used in bait fishing, which depart from traditional hook designs (e.g. circle hooks), may warrant further consideration if their ability to reduce hooking mortality in salmonids can be validated by scientific studies.

Scientific investigations have also demonstrated that there is no biological basis for barbed hook restrictions in artificial fly and lure fisheries for resident salmonids. For flies and lures combined, only minor differences in mean hooking mortality have been found between barbed (4.5%) and barbless (4.2%) hooks, in ten of eleven studies (Schill and Scarpella 1997). Because natural mortality rates for wild trout in streams commonly range from 30% to 65% annually, a 0.3% mean difference in hooking mortality for the two hook types is irrelevant at the population level, even when fish are subjected to repeated capture. Restricting barbed hooks in artificial fly and lure fisheries appears to be a social issue and managers should consider the social costs of implementing a barbed hook restrictions that produce no demonstrable biological gain. Anglers may always chose to use barbless hooks because they can be removed more easily (from humans as well as fish) thereby making the process less stressful and allow the angler to resume fishing more quickly.

Opportunity – Complete a review of scientific literature on the effectiveness of barbless hooks in reducing mortality and/or injury to salmonids.

Restrictions on fishing gear types (spinning vs. fly fishing) to reduce hooking mortality are not biologically justifiable. Therefore, a fly fishing only regulation should be considered primarily social in nature because there is no biological justification for maintaining this type of special regulation. Fly fishing Only areas are popular with fly anglers and may facilitate their spatial separation (which is generally considered to be a requirement for this form of angling). In New Jersey only one stream (Big Flatbrook) currently has a section regulated specifically for fly-fishing. During the 1960's, a three year study conducted on the Big Flatbrook, provided insight into the factors affecting the catch and harvest of trout stocked weekly for put and take fishery (Pyle and Soldwedel 1971)

New Jersey Trout Fishing Regulations

New Jersey's trout fishing regulations have evolved over more than a century, increasing in number and complexity to reflect changes in angler attitudes, interests, and the status of trout resources. These trout regulations can be separated into three categories that are referred to as general, special, and boundary water regulations. The statewide general trout regulation governs the majority of trout fishing activity statewide and separates trout-stocked waters into those with and without closed in-season stocking dates. The special regulation trout areas (wild trout streams, trout conservation areas, fly fishing only waters, trophy and holdover trout lakes) provide anglers with alternative opportunities to fish for trout under more restrictive conditions. Special regulation waters characteristically support trout year round and are managed through regulation to enhance the fishery and/or angling experience. In addition to the general and special regulations, waterbodies whose boundaries are shared with adjacent states, and thus in need of regulatory uniformity, have separate fishing regulations. Regulations in effect as of 2004 are stated below and include a narrative describing the background, current status, and management opportunities.

The privilege of fishing in New Jersey is generally available to all individuals provided they abide by established regulations. In New Jersey, individuals 16 to 69 years of age must obtain a fishing license prior to engaging in any angling activity in freshwaters (both public and private). In addition, licensed anglers must also possess a trout stamp when fishing for trout. A license and a trout stamp are valid for a calendar year. Specific details regarding licensing requirements and fees can be found in the Funding section of this plan.

General Statewide Trout Regulations

2005 GENERAL TROUT REGULATIONS (Brook, brown, and rainbow trout, and hybrids thereof)			
SEASON	**MINIMUM SIZE**	**DAILY LIMIT**	**EXCEPTIONS**
Jan. 1 through March 20	7 inches	4	1) Waters with in-season spring stocking closures are closed to fishing 5 a.m. to 5 p.m. on days listed for stocking. 2) Special regulation areas (wild trout streams, year round & seasonal trout conservation areas, fly-fishing, trophy & holdover trout lakes). 3) Lk. Hopatcong, Prospertown Lake, Manasquan Res., Farrington Lake, Pompton Lake, Lake Shenandoah and Spruce Run Res. – fishing is permitted during the period Mar. 21 to April 10 at 8 a.m. All trout caught during this period must immediately be released. 4) Greenwood Lk. & Delaware River – see separate regulations for Boundary Waters.
March 21 to Opening Day at 8 a.m.	Season Closed Fishing is prohibited on all waters listed for trout stocking		
Opening Day 8 a.m. through May 31	7 inches	6	
June 1 through December 31	7 inches	4	
LAKE TROUT REGULATIONS			
Jan. 1 through December 31	15 inches	2	Trophy Trout Lakes – Round Valley Reservoir, Merrill Creek Reservoir

<u>Background:</u>

In the years immediately prior to 1951 the regulations pertaining to trout fishing were fairly simple and straightforward. The trout season began at 8 a.m. on the 1^{st} or 2^{nd} Saturday in April and ended on September 30^{th}. Other than on opening day, fishing hours during this season were from sunrise to 9 p.m. EST. There was a seven-inch minimum size limit on trout (brook, brown, and rainbow) and a daily creel limit of eight trout. In addition, it was illegal to fish in any water listed for trout stocking between March 1^{st} and 8 a.m. on opening day. There was only one special trout regulation, and it pertained to fly fishing areas on two streams.

In 1951 the seven-inch minimum size limit was eliminated so that anglers could harvest all of the trout that were being stocked. At that time many of the stocked trout (especially those from federal fish hatcheries) were small, and since they were not expected to survive year round, it made little sense to protect them. In 1956 the trout season was extended to November 30^{th}. Significant changes to the trout regulations occurred in 1959. The daily creel limit was reduced from eight to six trout daily. It became legal to fish for trout during the period January 1^{st} through March 15^{th} and the trout season was also extended beyond November 30^{th}, to mid-March of the following year. Thus, anglers could fish for trout year round except for a pre-season closure period that began in early March and ended on opening day in April. In addition, certain specified trout-stocked waters had fishing closures on the days listed for stocking (see Trout Stocked Waters with Closed In-season Stocking Dates regulation).

Beginning in 1965 and continuing until 1977, the stocking dates were published for all trout-stocked waters (both those with and without closed in-season stocking dates). In 1977, this practice was discontinued, except on those waters that had closed in-season stocking dates. Waters not having closed in-season stocking dates continued to be listed, however, the number of in-season stockings, rather than the stocking dates, were given. In 1976 the daily creel limit for trout was reduced from six to four, for the period June 1st, to the start of the pre-season closure the following March. The traditional daily creel limit of six trout, from opening day to the end of May, was retained

Several large, trout-stocked waters (Lake Hopatcong, Swartswood Lake, Lake Wawayanda, and Spruce Run Reservoir) were opened to angling during the pre-season closure period in 1986. Anglers, particularly those targeting gamefish species other than trout (black bass, northern pike, muskellunge, walleye, hybrid striped bass), were no longer excluded from fishing at these large public lakes during the three-week period preceding opening day. However, all trout caught during this period had to be immediately released. Five waters have since been added to this exception, including Prospertown Lake, Manasquan Reservoir, Farrington Lake, Pompton Lake, and Lake Shenandoah.

In 1997 the seven-inch minimum size was re-established after a 46-year hiatus. This change was made primarily to protect naturally reproducing trout populations in streams not regulated as *Wild Trout Streams*. As an added benefit, small (subcatchable) surplus hatchery trout, particularly those stocked in the fall, would also be protected from immediate harvest. This minimum size requirement had a negligible impact on the harvestability of catchable trout that were stocked in the spring and fall since their average size is nine inches or more.

Current Status:

The current *General Trout Regulation* for brook, brown, and rainbow trout (and their hybrids) pertains to all waters statewide except those designated as special regulation trout waters or boundary waters. Anglers may generally fish for trout year round except during the three-week period before opening day in April on those waters listed for trout stocking (Appendix H). This “pre-season” closure allows DFW sufficient time to stock trout in nearly 200 waters listed for stocking prior to opening day. Most trout anglers eagerly anticipate opening day because it gives them the opportunity to fish for newly stocked trout that have not been subjected to any (or minimal) fishing pressure.

Opening day is traditionally selected to coincide with the first or second Saturday in April, and anglers must wait until 8 a.m. to begin fishing on that day. Saturday is the preferred day of the week for the season opener because angler participation is expected to be higher than if scheduled during the workweek (Monday through Friday). The date of opening day varies from year to year and over the last decade has ranged from April 6th to the 13th. New Jersey’s opening date has occasionally coincided with Pennsylvania’s opening day, (the Saturday in April closest to April 15th), but it does not conflict with New York’s opening day (always April 1st).

Trout may be harvested year round from all waters statewide (excluding those designated under special trout regulations) except during the three-week pre-season period. The daily creel limit allows anglers to take six trout from opening day through May 30th, which encompasses the seven-week stocking period that follows opening day. From June 1st to the start of the preseason closure the following year (mid-March) the daily creel is reduced to four trout. The current higher creel limit in the spring season is considered desirable, particularly on those waters that can not sustain trout through the summer months. It permits anglers to harvest trout that would otherwise succumb to unfavorable elevated water temperatures. The stocking dates for trout-stocked water are announced in advance (on the Trout Hotline, DFW website, and through news releases) to further encourage immediate utilization of the resource. The reduction in the daily creel later in the spring is intended to spread out the harvest of the trout resource whose numbers have gradually dwindled since opening day as stocking is scaled back. Waters may be replenished with trout through the fall and winter trout stocking programs.

Under the general regulation anglers may keep trout during the open season provided they are at least seven inches long. Because the catchable trout stocked as part of the spring, fall, and winter stocking programs typically measure at least nine inches long they can be immediately creeled by anglers. The seven-inch minimum also corresponds to the minimum size established under the *Wild Trout Stream* regulation. This was purposely done in order to provide some measure of protection to naturally reproducing trout populations in streams that are not designated as a *Wild Trout Stream*. In addition, more than 20 streams (or stream sections) that have reproducing trout populations are also trout-stocked and this minimum size is helpful in preventing the harvest of small, wild trout.

There are two notable exceptions to the statewide general regulations, aside from the special regulation trout areas. Seven trout-stocked waters are exempt from the pre-season closure (see exception #3) because they offer excellent opportunities to fish for other popular gamefish such as northern pike, muskellunge, walleye, hybrid striped bass, and black bass). Fishing is allowed on these waters during the pre-season period, however, all trout caught during this period must be immediately released. The other exception is the trout-stocked waters having closed in-season stocking dates which prohibits angling until 5 p.m. on the dates stocked (described separately later in this section).

In 2005, a statewide minimum size and creel limit was established for lake trout. Prior to 2005, size and creel limits for lake trout were established only for designated Trophy Trout waters. This change allows for introductions of lake trout into waters of the state other than Trophy Trout lakes.

Opportunity – Management goals and measurable objectives, and evaluation procedures need to be established for the general regulation.

Opportunity – Other states have special trout regulations that curtail harvest initially and liberalize harvest later in the season to extend the fishery (delayed harvest). The desirability of instituting a similar regulation on select trout streams should be explored.

Opportunity – Investigate the feasibility and overall effectiveness of developing regulations for individual trout species, of particular interest the brook trout, the State's only native salmonid, which may be more susceptible to angling pressure.

Trout Stocked Waters With Closed In-Season Stocking Dates

TROUT STOCKED WATERS WITH CLOSED IN-SEASON STOCKING DATES Waters specified below are closed to fishing 5 a.m. to 5 p.m. on dates listed for stocking, including all tributaries, for a distance of 100 ft. from the main channel.	
MONDAYS	Manasquan River – Rt. 9 bridge downstream to Bennetts bridge, Manasquan WMA Metedeconk River, N/Br. – Aldrich Rd. bridge to Ridge Ave. Metedeconk River, S/Br. – Bennetts Mill dam to twin wooden foot bridge, opposite Lake Park Blvd. on South Lake Drive, Lakewood Rockaway River – Longwood Lk., dam (Jefferson Twp.) to Jersey City Reservoir in Boonton Toms River – Rt. 528, Holmansville, to confluence with Maple Root Branch, and Rt. 70 bridge to Rt. 571 bridge (Exception: The section regulated as a year-round trout conservation area.) Walkill River – Lake Mohawk dam to Rt. 23, Hamburg
TUESDAYS	Pohatcong Creek – Rt. 31 to Delaware River Raritan River, S/Br. – Budd Lake, dam to jct. With N/Br. Raritan River (Exception: The sections regulated as year-round trout conservation areas.)
WEDNESDAYS	Raritan River, N/Br. – Peapack Rd. bridge in Far Hills to jct. With S/Br. Raritan River
THURSDAYS	Black River – Rt. 206, Chester to the posted Black River Fish & Game Club property at the lower end of Hacklebarney State Park Paulinskill River, E/Br. and W/Br. – Limecrest RR spur bridge on E/Br., Sparta Twp., and Warbasse Jct. Rd. to (Rt. 663) on W/Br., Lafayette Twp., to Columbia Lake (Exception: The section regulated as a year-round trout conservation area.) Ramapo River – State line to Pompton Lk. (including Potash Lake)
FRIDAYS	Big Flat Brook – 100 ft. above Steam Mill bridge on Crigger Rd. in Stokes S.F. to Delaware River Musconetcong River – Lk. Hopatcong dam to Delaware R. including all mainstream impoundments except for Lk. Musconetcong Pequest River – Source downstream to Delaware River Wanaque River – Greenwood Lk. Dam to jct. with Pequannock River, excluding Wanaque Res., Monksville Res., and Lk. Inez

Background:

Prior to 1959 the statewide general trout regulation applied uniformly to all freshwaters except those designated as *Fly-Fishing Waters*. In 1959, 25 trout-stocked waters (19 streams and 6 lakes) were selected for a regulation that was initially referred to as “Special Closed Days.” Beginning with the 3rd week in April and continuing weekly through June, these designated waters were closed to fishing, beginning ½ hour before sunrise on the weekday listed for stocking and continued for 24 or 48 hours. This included all feeder streams and tributaries to the main channel of these designated waters.

In 1960, the time for the closure was modified to 4 a. m. and 4 p. m, and one year later changed again, to 5 a.m. and 5 p.m. In 1963 a 24-hour closure period (beginning at 5 a.m.) was established for all designated waters. In 1965, the list of waters having “special closed days" was greatly expanded to include more than 150 trout-stocked streams and lakes. The 24-hour closure period was shortened to 12 hours (5 a.m. to 5 p.m.) in 1972.

In 1976 this regulation was significantly modified when the number of waters was drastically reduced to 17 major streams in north and central Jersey. These waters were closed to fishing (from 5 a.m. to 5 p.m.) on a set day of the week, over a six-week period commencing ten days after opening day. The remaining waters listed for trout stocking had the number of anticipated in-season stockings indicated. Two years later, in 1978, the number of in-season stockings was increased to seven for most of the streams. By 1979 the number of waters covered under this regulation stood at 16 and since that time the regulation has changed little.

Current Status:

Sixteen streams are designated as *Trout Stocked Water Having Closed In-season Stocking Dates* (Figure 13). Over the seven-week period following opening day, each stream is stocked weekly with trout on an established day of the week (Monday through Friday) and is closed to fishing from 5 a.m. to 5 p.m. on the days listed for stocking. These streams are often simply referred to as "Closed Waters." While the rationale behind the original adoption of this regulation 45 years ago is not known, currently it is viewed as a means of giving anglers a reasonably equal opportunity to fish for newly stocked.

Catchable trout stocked in the spring are often quickly caught and harvested soon after they are stocked, many anglers prefer to fish for trout as soon as possible following stocking to maximize success and to have a satisfying experience. However, many anglers are unable to fish for trout during the morning and early afternoon on weekdays (Monday through Friday) because of work obligations. The late afternoon starting time (5 p.m.) gives anglers time to arrive at a stream and have the same opportunity as others to fish for trout stocked earlier in the day. The 12-hour closure also gives the newly stocked trout an opportunity to disperse before angling commences. The closure also has the added benefit of discouraging anglers from following the hatchery truck to gain an advantage by being the first on the scene to fish for freshly stocked trout.

Although this regulation is widely accepted by the majority of anglers, individual anglers periodically request that the stream remain closed until the morning of the day following stocking. This change would give trout additional time to acclimate to their new surroundings. It might also benefit anglers who can not get off work in time to reach the stream by 5 p.m. (but could fish the stream at 5 a.m. the following morning). However, an overnight closure would pose enforcement difficulties (closure period extending outside the normal working hours of law enforcement staff and the cover of darkness would be conducive to poaching) that would quickly outweigh any perceived benefits of such a change.

Opportunity – Management goals, measurable objectives, and evaluation procedures need to be established that would assist managers in evaluating success of the regulation governing water having closed in-season stocking dates.

Opportunity – Several streams (or stream reaches) covered by the "closed in-season stocking dates" regulation experience late spring and summer water temperatures that can negatively affect trout survival. Trout stocked in these waters during the latter part of the spring in-season stocking period (Weeks 6 and 7) may be underutilized if temperature and stress related mortalities occur.

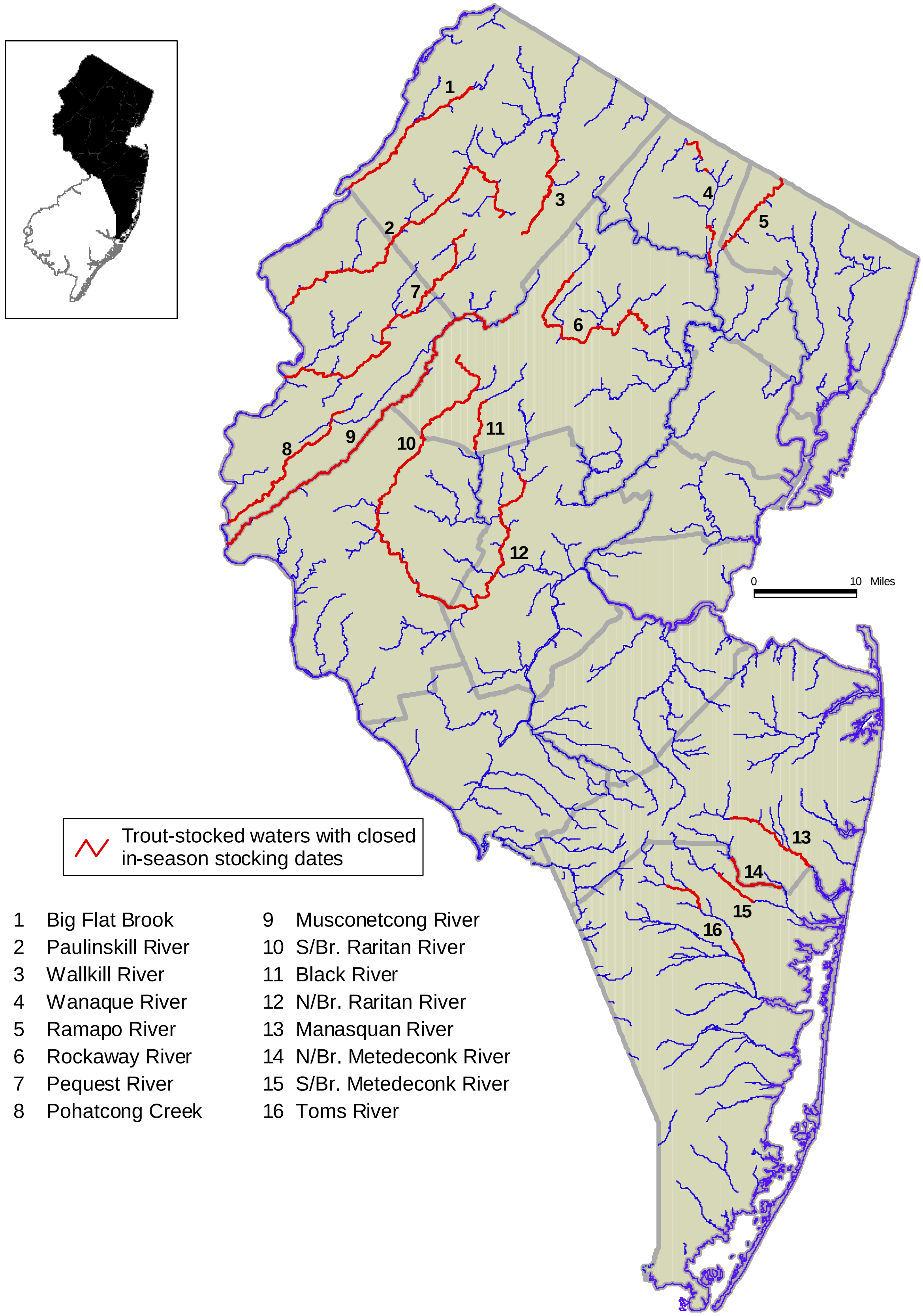


FIGURE 13.— New Jersey waters designated as *Trout Stocked Waters Having Closed In-season Stocking Dates*, in 2005.

Wild Trout Stream Regulation

WILD TROUT STREAM REGULATION			
SEASON	**MINIMUM SIZE**	**DAILY LIMIT**	**RESTRICTIONS (in effect year round)**
Opening Day at 8 a.m. through Sept. 15	7 inches (see #3)	2	1) Only artificial lures may be used. 2) Possession or use of bait (live or preserved) or any substance (natural or synthetic) that contains a concentration of bait scent is prohibited. 3) The minimum size for brown trout in Vans Campens Bk. & Pequannock R. is 12 inches.
Jan. 1 to Opening Day at 8 am. And Sept. 16 through Dec. 31	Catch & Release Only		

Bear Creek (Southtown)
Bear Swamp Brook (Mahwah)
Black Brook (Clinton WMA)
Burnett Brook (Ralston)
Cold Brook (Oldwick)
Dark Moon Brook (Johnsonburg)
Dunnfield Creek (Del. Water Gap)
Flanders Brook (Flanders)
Hances Brook (Penwell)
Hickory Run (Califon)
India Brook (source to Mountainside Ave., Mendham)
Indian Grove Brook (Bernardsville)
Jackson Brook (source to Hedden Park Lake, Mine Hill Twp.)
Ledgewood Brook (Ledgewood)
Little York Brook (Little York)
Lomerson Brook (Pottersville)
Merrill Creek (Stewartsville)
Mill Brook (Montague)
N/Br. Rockaway Creek (Mountainville)
Parker Brook (Stokes S.F.)
Passaic River (source to Rt. 202, Bernardsville)
Pequannock River (NewarkWatershed, Oak Ridge Rd. bridge downstream to railroad bridge immediately upstream of Charlottesburg Res.)
Rhineharts Brook (Hacklebarney S.P.)
Rocky Run (Clinton Twp.)
Saddle River (stateline to Lake Street, Upper Saddle River)
Stephensburg Creek (Stephensburg)
Stony Brook (Stokes S.F.)
Stony Brook (Washington Twp, Morris Co.)
Tetertown Brook (Tetertown)
Trout Brook (Hacklebarney SP)
Turkey Brook (Mt. Olive)
Van Campens Brook (Delaware Water Gap Nat'l Recreation Area)
West Brook (source downstream to Windbeam Club property)
Whippany River (source to Tingley Road, Mendham Twp.)
Willoughby Brook (Clinton Twp.)

Background:

New Jersey first began to manage a reproducing trout population in a specific stream, using a biologically based fishing regulation, in 1974 when the *Natural Trout Fishing Area* regulation was adopted. This regulation was developed partially in response to interest expressed by members of Trout Unlimited. The DFW initially recommended to the Fish and Game Council that two stream sections, the Blewitt tract on the Big Flatbrook, and Mulhockaway Creek be included under the new regulation. However, the proposed Blewitt Tract section, already regulated as a *Fly Fishing Only Area,* did not have the support of the local landowners, and the Council opted to confine the regulation to Mulhockaway Creek.

A 0.3 mile stretch of Mulhockaway Creek (Hunterdon County), inhabited by a reproducing brown trout population, was selected for special regulation and stocking was discontinued. Anglers were only allowed to fly-fish using artificial flies having barbless hooks and could only harvest one trout per day measuring at least 12 inches. Fishing was permitted from 5 a.m. to 9 p.m. except during the statewide pre-season closure period. This regulation was evaluated over a three-year period using a manned creel survey to estimate angler utilization and harvest (Soldwedel and Pyle 1977). Electrofishing surveys to monitor the trout population status were also conducted during the spring, summer, and fall. A nearby stretch of Spruce Run Creek, a trout-stocked water, was used as a control in the study.

This study showed the growth of wild brown trout compared favorably to the growth rates of hatchery brown trout. Influxes of brown trout stocked from Spruce Run Reservoir occurred during the summer (because of poor water quality conditions in the reservoir) and late fall (for spawning purposes). Although the Mulhockaway Creek Natural Trout Fishing Area was used less frequently by anglers during the spring than Spruce Run Creek, the remainder of the year it was more heavily used by anglers. Angler catch rates for the Natural Trout Area, over the entire study period, were lower than on Spruce Run Creek (0.19 and 0.48 trout per hour, respectively). For the period June through November the catch rates were slightly greater on Mulhockaway Creek than Spruce Run Creek (0.23 and 0.20 trout per hour. respectively).

The low overall catch rate from the Mulhockaway Creek Natural Trout Area was considered the sole detracting point of the special regulation and appeared to be most likely related to the low susceptibility of the wild brown trout to angling. It was suggested that the catch rate might be increased, without jeopardizing the trout population, by liberalizing the gear restriction so as to permit the use of any barbless, single hook, artificial lure and by physically improving the area to increase trout holding capacity and angler access.

In 1979 a 3.3 mile section of Van Campens Brook (Warren County), from the powerline at the Watergate recreation area downstream to the Delaware River, was included under this regulation. Although trout stocking was discontinued in the special regulation stretch, stocking continued further upstream. Anglers were allowed to use artificial flies <u>and</u> lures having a single pointed barbless hook. A ten-inch minimum size was instituted for trout on Van Campens Brook, which was inhabited by reproducing populations of brook, brown, and rainbow trout. In 1982 the single barbless hook requirement was dropped and in 1984 the special regulation area on Mulhockaway Creek was dropped. In 1985 the entire length of Van Campens Brook was designated a *Natural Trout Fishing Area* and trout stocking ceased. Fishing and the harvest of trout were permitted year round.

In the late 1960’s and early 1970’s the DFW had identified over 100 trout production streams and tributaries statewide. The DFW fought hard for, and by the early 1980’s achieved, recognition of the fragile nature and needs of the state’s natural trout reproduction waters in the planning and regulatory programs of other NJDEP agencies. Yet, as of 1989 only one of these streams, Van Campens Brook, was being managed under a special fishing regulation designed to provide an attractive angling experience while conserving wild trout. In 1990, as part of a major adjustment to the DFW’s coldwater fisheries management programs, the existing *Natural Trout Fishing Area* regulation was replaced with a new regulation called *Wild Trout Streams*. Twenty-nine streams (or stream sections) which had reproducing trout populations were selected for inclusion under this newly created regulation. Selection was loosely based upon a stream’s ability to support a quality fishery for wild trout. A good geographic distribution of trout production streams across north Jersey was also a factor since increasing public awareness and recognition of these waters was considered important. A number of the streams selected had been traditionally stocked with cultured trout and this practice was discontinued.

Fishing was permitted year round in designated streams with harvest allowed from opening day in April through September 15th. The reduced creel limit (two trout per day), coupled with a minimum harvestable size (seven inches), harvest season, and gear restrictions (artificials only) were intended to allow for a reasonable use while protecting the population from over harvest. A higher minimum size was imposed on several streams (Van Campens Brook and the Pequannock River stretch) because of good brown trout growth rates. In 1992 the use of scented or natural baits was banned to further minimize hooking mortality. Also the 12 inch minimum size for Van Campens Brook and the Pequannock River was modified to apply only to brown trout.

Over the years the following streams have been added to this program when supported by biological data: Indian Grove Brook and the headwaters of the Passaic River (1992), lower Merrill Creek (1996), Dunnfield Creek (1997), portions of Jackson Brook, Saddle River and Whippany River (2004).

Current Status:

Currently there are 35 streams (or portions thereof), flowing through both publicly and privately owned lands, that are regulated as *Wild Trout Streams* (Figure 14). This figure represents 20 percent of the streams that have been identified as having reproducing trout populations. Private ownership can and does limit the ability of an angler to legally access some of these streams. Angling activity on most of the *Wild Trout Streams* is believed to be low with the majority of anglers practicing catch-and-release fishing.

Opportunity – Management goals and measurable objectives, and evaluation procedures need to be established for streams governed by the *Wild Trout Stream* regulation. This information would assist managers in evaluating regulation success on individual waters and justify management decisions.

Opportunity – There are approximately 140 additional trout production streams that could potentially be included under this regulation. Specific criteria, which would assist managers in selecting additional trout production streams for inclusion under the *Wild Trout Stream* regulation, need to be established.

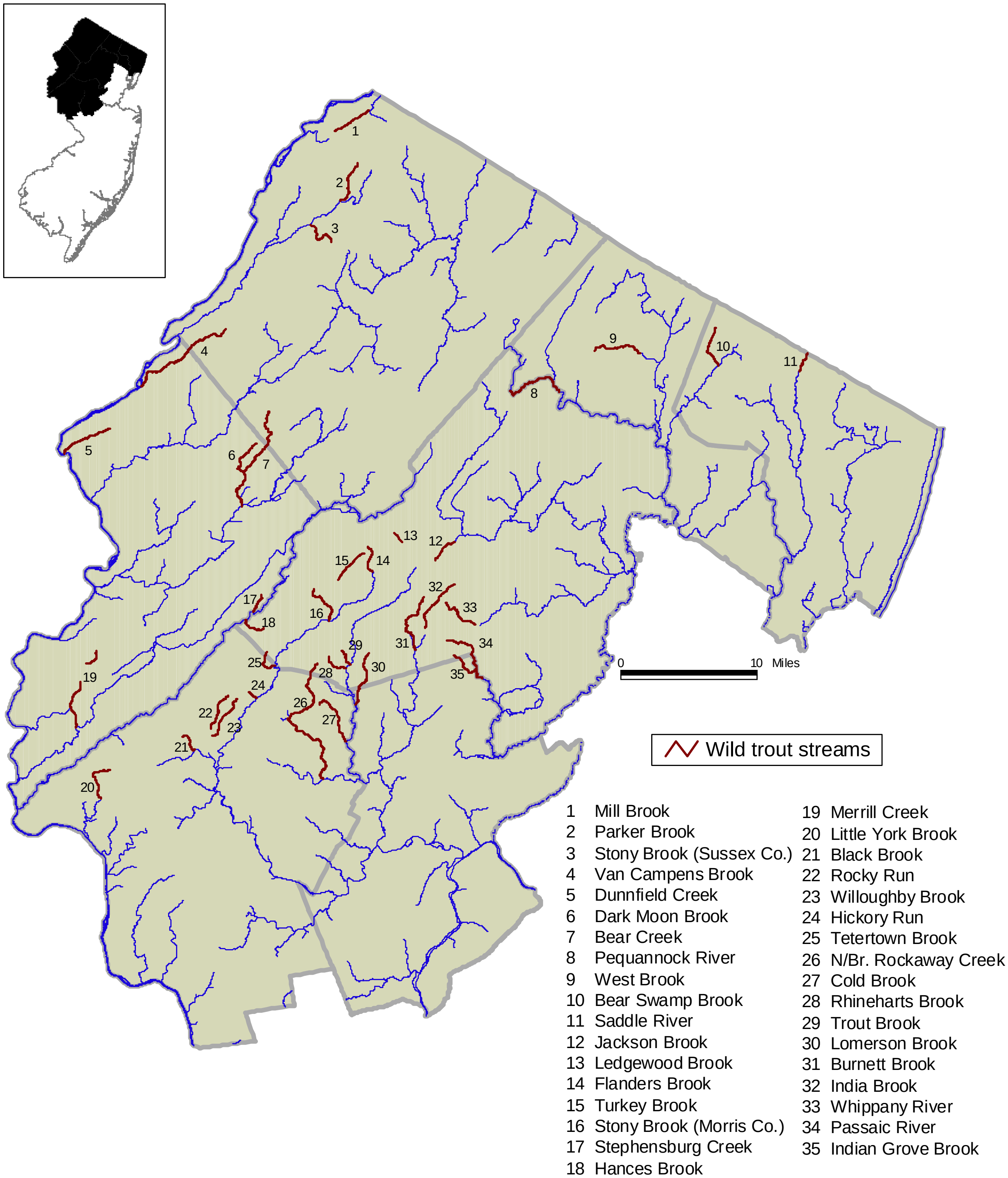


FIGURE 14.— New Jersey streams designated as *Wild Trout Streams*, in 2005.

Year Round Trout Conservation Area Regulation

<table>
<tr><th colspan="4">2005 YEAR ROUND TROUT CONSERVATION AREA REGULATION -</th></tr>
<tr><th>SEASON</th><th>MINIMUM SIZE</th><th>DAILY LIMIT</th><th>RESTRICTIONS (in effect year round)</th></tr>
<tr><td>January 1 though March 20</td><td>15 inches</td><td>1</td><td rowspan="3">1) Only artificial lures may be used.
2) Possession or use of bait (live or preserved) or any substance (natural or synthetic) that contains a concentration of bait scent is prohibited.
3) Fishing is permitted during the in-season stocking closures, which apply to the river. All trout caught during these periods must be immediately released.</td></tr>
<tr><td>March 21 to Opening Day at 8 a.m.</td><td colspan="2">Catch & Release Only</td></tr>
<tr><td>Opening Day at 8 a.m. through Dec. 31</td><td>15 inches</td><td>1
(see #3)</td></tr>
<tr><td colspan="4">Paulinskill River, E/Br. (Sussex County) – from the Limecrest railroad spur bridge downstream to its confluence with the W/Br. Paulinskill at Warbasse Jct. (approx. 2.25 miles)
Raritan River, S/Br. (Hunterdon County) – the stretch of water known as the Ken Lockwood Gorge, a distance of approximately 2.5 miles
Raritan River, S/Br. (Morris County) – a section of river, known locally as the Claremont Stretch, extending from the downstream end of the posted Anglers Anonymous property downstream to its junction with Electric Brook (approximately 1.1 miles)
Toms River (Ocean County) – the downstream end of Riverwood Pk. in Dover Twp., defined by markers, downstream to the Rt. 571 bridge (approximately 1 mile)</td></tr>
</table>

Background:

As part of a broad effort to address changing angler attitudes and trout resources, the *Year Round Trout Conservation Area* (YTCA) regulation was adopted in 1990 to provide an alternative to traditional put-and-take trout fisheries. The regulation was designed to exploit the potential of a stream's trout carrying capacity, while recognizing the need for periodic stocking of catchable trout to maintain high angling quality. The regulation allowed anglers to fish year round with artificial lures only, and retain one trout 15 inches or greater per day, except during the traditional 3 week pre-season period and in-season stocking closures all trout caught had to be immediately released. Stocking was curtailed in the spring, with catchable trout (averaging 10.5 inches) stocked once pre-season and twice in-season (Weeks 3 and 7). Stream selection was based upon a stream's ability to support a quality year round trout fishery under restrictive regulations. Streams were to have the capacity to carry a substantial number of trout, with little or no loss in condition of the fish. Only superior trout maintenance or proven trout production streams would be considered for this regulation.

Originally 6 stream sections were proposed for inclusion under this regulation: Toms River (Rt. 70 bridge downstream to Rt. 571 bridge), Paulinskill River (Limecrest to Lafayette), Black River (Hacklebarney State Park), Big Flat Brook (Rt. 206 bridge downstream to Roy bridge), S/Br. Raritan River (Ken Lockwood Gorge), and Pequest River (RR bridge above Hatchery Rd. bridge downstream to Pequest-Furnace Rd. bridge).

However, in response to angler opposition to this regulatory change for several streams (in particular the Big Flat Brook and S/Br. Raritan River, which were regulated as *Fly Fishing Only Areas* at the time) the original proposal was scaled back. Only sections of the E/Br. Paulinskill River and a shortened Toms River stretch (2¼ miles and ½ mile, respectively) were initially adopted. In 1992 a prohibition banning the use of scented or natural baits was added to further minimize hooking mortality and the Toms River stretch was lengthened to 1 mile.

The Claremont stretch of the S/Br. Raritan River (1.1 miles) was added in 1995 and stocking was discontinued in this stretch to allow the existing wild brook and brown trout populations to provide a fishery. In 2002, another section of the S/Br. Raritan River, known as the Ken Lockwood Gorge (2.5 miles) was also designated a YTCA. Both of these regulatory changes were controversial when first proposed. In particular the change for the Gorge, which had been regulated as a *Fly Fishing Only Area*, was hotly debated. Anglers concerned about losing the nearly exclusive fly fishing only privileges in the Gorge voiced opposition, while others (Trout Unlimited and the Hunterdon County Federation of Sportsmen's Clubs) supported the change.

Current Status:

Four stream segments, encompassing almost nine miles of stream, are currently covered by the *Year Round Trout Conservation Area* regulation (Figure 15). These areas are considered primarily catch-and-release fisheries because of the low daily creel limit (1 per day, except no harvest allowed during the pre-season and in-season closures) and high minimum harvestable size of 15 inches. In the spring these stream sections are stocked with catchable trout less frequently than the stream as a whole (three, rather than eight times). The first spring stocking (brook trout)is done as early as possible during the pre-season period to provide a quality angling experience at a time when trout fishing opportunities are limited. The next two stockings occur in-season, Week 3 (rainbows) and Week 7 (browns).

Opportunity – Management goals and measurable objectives need to be established for streams governed by the *Year Round Trout Conservation Area* regulation. This information would assist managers in evaluating regulation success on designated waters and justify management decisions.

Opportunity – Other trout maintenance and trout production streams that support trout year round may be suitable for inclusion under this regulation. In particular the section of the Musconetcong River currently regulated as a *Seasonal Trout Conservation Area* may warrant further consideration. Specific criteria, which would assist managers in selecting additional stream segments for inclusion under the *Year Round Trout Conservation Area* regulation, need to be established.

Opportunity – Determine if current regulations on designated *Seasonal* and *Year Round Trout Conservation Areas* waters provide appropriate protection for these popular recreational areas.

Opportunity - The Claremont stretch on the S/Br. Raritan River supports a reproducing brook and brown trout population. Existing data should be re-examined to determine if it would be more appropriately regulated as a *Wild Trout Stream*.

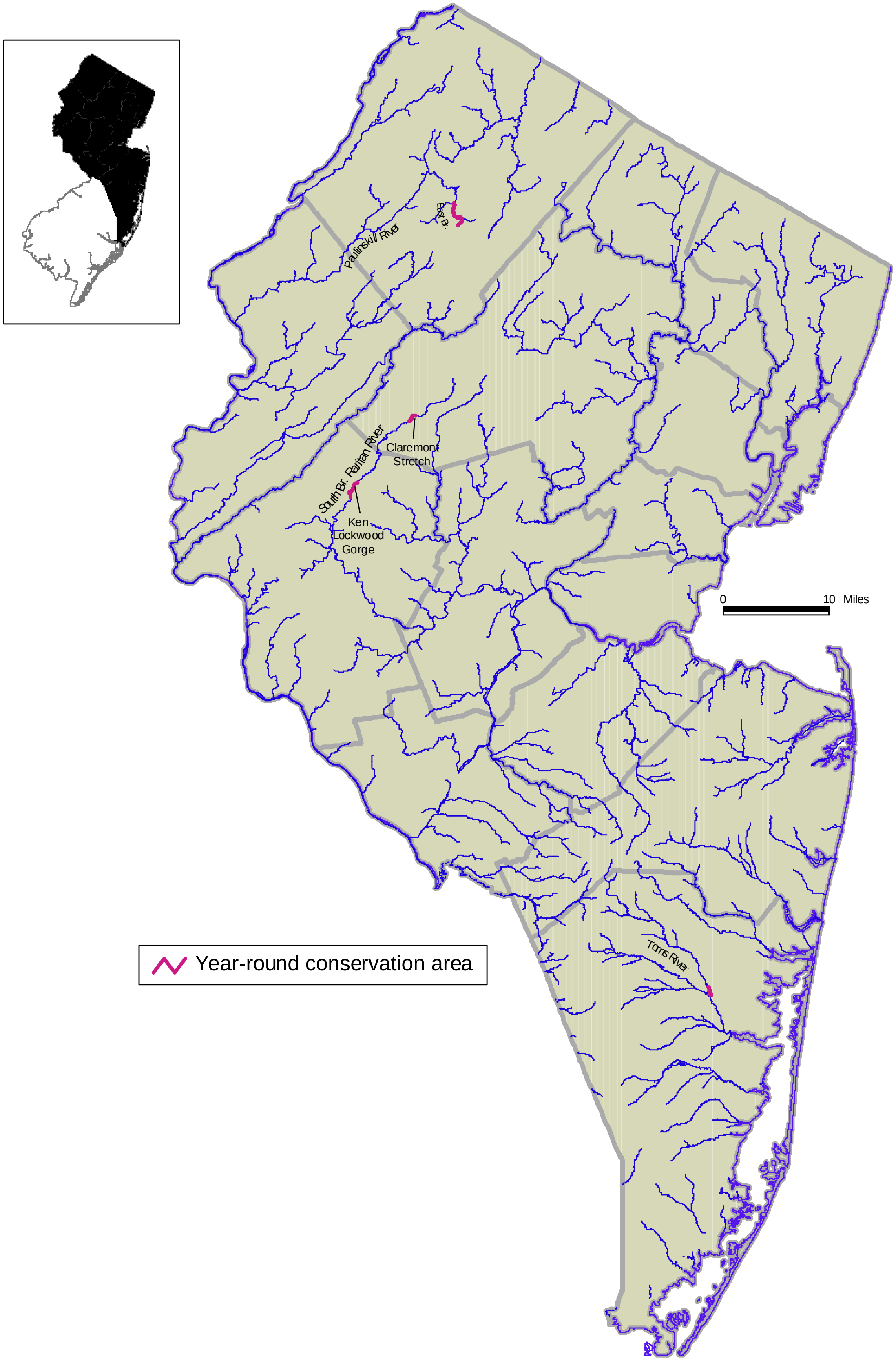


FIGURE 15.— New Jersey streams designated as Year Round Trout Conservation Areas, in 2005.

Seasonal Trout Conservation Area Regulation

2005 SEASONAL TROUT CONSERVATION AREA REGULATION

SEASON	MINIMUM SIZE	DAILY LIMIT	RESTRICTIONS
January 1 though March 20	15 inches	1	1) Only artificial lures may be used. 2) Possession or use of bait (live or preserved) or any substance (natural or synthetic) that contains a concentration of bait scent is prohibited. 3) Pequest River – fishing is not permitted during the first six in- season stocking closure dates. Fishing is permitted during the last in-season stocking closure date (May 27), but all trout caught between 5 a.m. and 5 p.m. must be immediately released.
March 21 to April 8.	Catch & Release Only		
Opening Day (12:01 a.m. to 8 a.m.)	Fishing Prohibited		
Opening Day at 8 a.m. through May 22 Gear restrictions do not apply	7 inches	6	
May 23 through December 31	15 inches	1	

Pequannock River (Morris/Passaic Counties) – Rt. 23 bridge at Smoke Rise downstream to the Rt. 23 bridge at Smith Mills (approximately 1.2 miles)

Pequest River (Warren County) – from the Conrail Railroad bridge located upstream of the Pequest Trout Hatchery Access Rd. downstream to Rt. 625 (Pequest Furnace Rd.) bridge (approximately 1 mile)

Musconetcong River (Hunterdon/Warren Counties) – Penwell Road bridge downstream to the Point Mtn. Road bridge, a distance of approximately 1.2 miles

Background:

When the Pequest Trout Hatchery was constructed in mid-1980 a ½ mile section of the Pequest River adjacent to the hatchery was selected for regulation as a trout conservation area (TCA). When enacted in 1987, the regulation was in effect from May 30th through October 2nd, and anglers were restricted to using artificial lures and flies and one trout per day 15 inches or greater. The season was intentionally sandwiched between the spring and fall trout stocking periods so as not to impact anglers accustomed to fishing with bait for stocked trout in this stretch.

In 1989 it was proposed that the Pequest River stretch be switched over to the newly proposed year round regulation. Sections of the following four waters were also recommended for the seasonal category: Manasquan River (RR bridge in Howell Twp, downstream to I-195 bridge), Musconetcong River (Stephens State Park), Wanaque River (Greenwood lake downstream to Monksville Reservoir), and the Rockaway River (Washington Pond downstream to Rt. 46 bridge). These major streams were considered good candidates for this "extended catch" regulation. However, the angling public did not favor these changes and these waters were dropped from consideration and the Pequest River retained its seasonal designation.

Since its initial adoption, the *Seasonal Trout Conservation Area* (STCA) regulation and designated waters have been modified several times. In 1991 the length of the Pequest River stretch was doubled to 1 mile and the season was substantially lengthened to include the last week of the spring stocking season all the way to the pre-season closure the following March. This change effectively protected the catchable trout stocked during Week 7 of the spring stocking period and in the fall, from immediate harvest, thereby affording anglers with a more sustainable fishery. A 1.2 mile stretch of the Pequannock River was added in 1992.

The next regulatory change did not occur until 2000, when catch-and-release fishing (with gear restrictions) was allowed during the pre-season stocking closure. This change gave anglers more opportunities to fish for trout at a time of year when most trout-stocked streams were closed to fishing. In 2002 a 1.2 mile stretch of the Musconetcong River near Point Mountain was added when thermal studies indicated this stretch could hold trout year round. The *No Kill* regulation (year round catch-and-release fly fishing with single hook, barbless artificial flies), located further upstream near Hackettstown, was eliminated when the same study indicated water temperatures there frequently exceeded levels that were stressful and lethal to trout.

Current Status:

Three stream sections, encompassing 3.4 total stream miles are currently designated under the *Seasonal Trout Conservation* Area regulation (Figure 16). This seasonal regulation allows anglers to fish without gear restrictions on opening day and the following six weeks. Therefore, anglers who fish with bait, and those who enjoy creeling trout, are not displaced during this six-week period, when trout fishing is most popular. Thereafter only artificial flies and lures may be used (no artificial bait scent allowed). Trout are stocked weekly in the spring on two rivers (Musconetcong and Pequest) that are also designated with closed in-season stocking dates, and less frequently on the Pequannock River (six times in-season).

These stream sections may also be fished during the three weeks prior to opening day (gear restrictions and catch-and-release regulations apply). They are stocked as early as possible during the pre-season period to provide an attractive fishery and to increase participation at a time when most other trout-stocked waters are closed to angling. The Musconetcong and Pequest Rivers are also stocked with catchable rainbow trout in the fall. The Pequannock is not stocked with brown trout because of an existing wild brown trout population.

Opportunity – Management goals and measurable objectives need to be established for streams governed by the *Seasonal Trout Conservation Area* regulation. This information would assist managers in evaluating regulation success on designated waters and justify management decisions.

Opportunity – Other trout maintenance and trout production streams that support trout year round may be suitable for inclusion under this regulation. Specific criteria, which would assist managers in selecting additional stream segments for inclusion under the *Seasonal Trout Conservation Area* regulation, need to be established.

Opportunity – The daily creel limit in effect on opening day and six weeks thereafter is currently six per day on waters designated *Seasonal Trout Conservation Area* waters. A reduced creel limit during this period should be considered to improve trout availability during the remainder of the year when special regulations are in effect.

Opportunity – There is speculation that few trout attain the 15-inch minimum harvestable size on designated *Seasonal Trout Conservation Area* waters. Data should be collected that would assist managers in evaluating and determining if a lower minimum size would be appropriate.

Opportunity – The Pequest River stretch consistently harbors large trout (which probably escape from the hatchery but continue to linger because of the hatchery discharge to the Pequest), particularly in the fall. This situation may present a unique opportunity for development of a management strategy that would capitalize on this fishery.

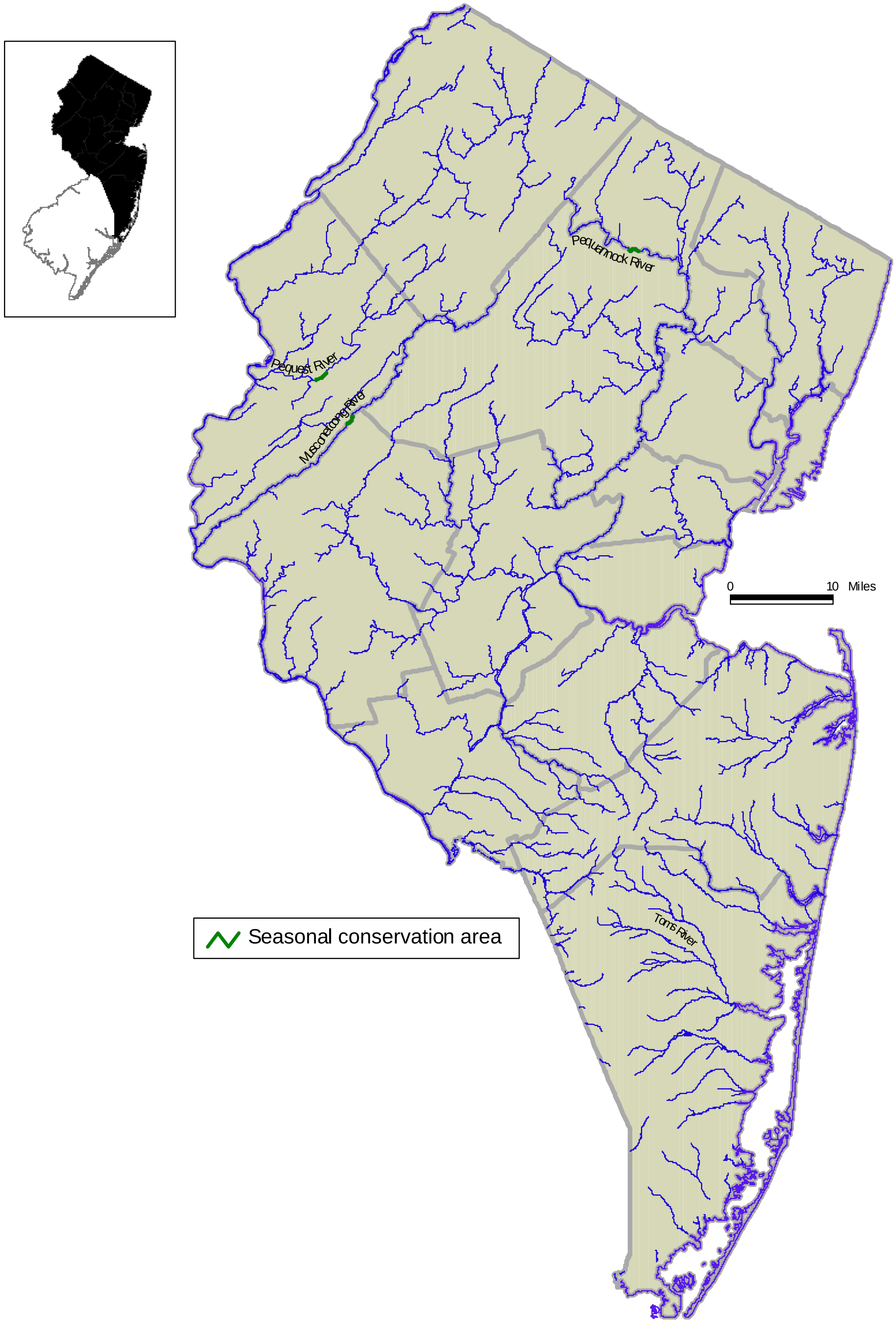


FIGURE 16.— New Jersey streams designated as *Seasonal Trout Conservation Areas*, in 2005.

Fly Fishing Only Area Regulation

<table>
<tr><th colspan="4">2005 FLY FISHING ONLY AREA REGULATION</th></tr>
<tr><th>SEASON</th><th>MINIMUM SIZE</th><th>DAILY LIMIT</th><th>RESTRICTIONS</th></tr>
<tr><td>January 1 through March 20</td><td>7 inches</td><td>4</td><td rowspan="5">1) Only artificial flies are allowed, which are expressly limited to dry flies, wet flies, bucktails, nymphs and streamers. Expressly prohibited are metal, plastic, or wooden lures, plugs, spinners, and flies with spinners attached or any multiple hooked device.
2) Possession or use of bait (live or preserved) or any substance (natural or synthetic) that contains a concentration of bait scent is prohibited.
3) Fishing is not permitted from 5 a.m. to 5 p.m. during the in-season stocking closures</td></tr>
<tr><td>March 21 to Opening Day at 8 a.m.</td><td colspan="2">Fishing prohibited</td></tr>
<tr><td>Opening Day at 8 a.m. to April 18 at 5 a.m.
Gear restrictions do not apply except on Blewett Tract</td><td>7 inches</td><td>6</td></tr>
<tr><td>April 18 at 5 a.m. through May 31</td><td>7 inches</td><td>6</td></tr>
<tr><td>June 1 through December 31</td><td>7 inches</td><td>4</td></tr>
<tr><td colspan="4">Big Flat Brook (Sussex County) – Rt. 206 bridge downstream to the Roy bridge on Mountain Rd., a distance of approximately 4 miles, except that portion known as the Blewett Tract
Blewett Tract (Sussex County) – a 0.5 mile portion on the Big Flat Brook clearly defined by markers, which extends from the Three Bridges Rd. to a point upstream of the jct. of the Big Flat Bk. And Little Flat Bk.</td></tr>
</table>

Background:

This regulation was established more than 40 years ago, presumably in response to public demand for fly fishing locations. Over the years a number of streams had sections designated as Fly Fishing Only, including the Rahway River, Paulinskill River, Musconetcong River, Flatbrook, and S/Br. Raritan River. One trout-stocked lake, Lake Wapalanne, was also included under this regulation for one year (1966). Originally the regulation specified that only fly fishing would be allowed for about a six month period that began 30 days after opening day in April (the first or second Monday in May) and ended on November 30th. Anglers could use only artificial flies (bait was prohibited) during this period and creel six trout daily. At other times of the year anglers were allowed to fish with spinning gear and bait and harvest six trout daily (fishing was not allowed during the pre-season closure).

Several of the designated fly fishing waters had additional restrictions related to season, creel limits, and gear. Until dropped from this regulation in the late 1960's the Paulinskill River had several sections designated for fly fishing only year round (a one mile stretch below Paulinskill Lake and the Emmons property, a 1¼ mile stretch upstream of Fredon-Stillwater Road). Another notable exception was a short, ½ mile stretch of the Big Flat Brook known as the "Blewett Tract." The owner of this property (Mr. Blewett) allowed people to fish provided they always used fly fishing gear. When the property was sold to the federal government in the early 1960's this tradition was continued by specifying in the Fish Code that this stretch would be regulated as fly fishing only year round. Lake Wapalanne was also designated fly fishing only year round. These year-round exceptions did stipulate that fishing was not permitted during the spring pre-season and in-season closures that applied to the river as a whole. Restrictions on daily creel limits and gear came into play during the 1960's. Several waters were designated "no-kill" (all trout caught must be returned to the water unharmed), including the Paulinskill River stretches, Lake Wapalanne, and a one mile stretch on the Musconetcong River near Hackettstown (in 1965). The use of barbless hooks also became a requirement on the no-kill waters in the 1960's.

In 1970 the fly fishing stretches on the Paulinskill River were dropped from the regulation. A section of the Rahway River in a Union County Park (a half mile stretch, from Wall Street to Oceola Falls) was briefly included under the Fly Fishing Only regulation but was dropped after 1970. Over the next three decades, until 2002, three streams retained this special regulation – the Flatbrook (Rt. 206 bridge downstream to the end of the Roy Tract, including the Blewett Tract), the S/Br. Raritan River (Ken Lockwood Gorge), and the Musconetcong River (Schooley's Mountain Road bridge downstream). The year round fly fishing requirement also continued on both the Blewett Tract (closed to fishing during the pre-season period) and the no-kill stretch on the Musconetcong River.

The fly fishing period was gradually lengthened, by increments of one week, over the 1960's and 1970's by moving the start date closer to opening day. By 1974 the fly fishing only period, that once began 30 days after opening day, went into effect nine days after opening day. The fly fishing period was further increased in 1993, when the ending date was extended from November 30th through the winter to mid-March (coinciding with the start of the pre-season closure). The only times of year that an angler could fish (on the Flatbrook and S/Br. Raritan River fly stretches) with conventional spinning gear, lures, or bait was during a ten-day period commencing with opening day. In the late 1970's the statewide daily creel limit was reduced from six to four trout daily after May 31st, and this change was also applied to the fly fishing waters (except on the no-kill Musconetcong River stretch).

In 2002 two significant and controversial changes occurred when two waters were removed from the *Fly Fishing Only* regulation. The no-kill stretch of the Musconetcong River was dropped when a water temperature study on the river indicated temperatures stressful and lethal to trout frequently occurred in the no-kill stretch during the summer. To counter this change a downstream section of the river near Point Mountain, which had summer water temperatures favorable for trout, was designated a *Seasonal Trout Conservation Area*. The Ken Lockwood Gorge (S/Br. Raritan River) was also dropped from this regulation as a result of public input and incorporated into the *Year Round Trout Conservation Area* regulations.

Current Status:

Since 2002 only the Big Flatbrook section (four miles), which includes the ½ mile Blewett Tract stretch, has been retained under the *Fly Fishing Only Area* regulation (Figure 17). The statewide general regulations, with respect to minimum size and daily creel, apply (six per day from opening day through May 31st, and four daily thereafter, closed to fishing the three weeks prior to opening day). On opening day, and the next eight days thereafter, there are no gear restrictions, except on the Blewett Tract. The remainder of the year anglers may only use fly fishing equipment and artificial flies (no bait scent). The stream is stocked weekly during the seven weeks following opening day and is closed to fishing on the scheduled stocking dates (*see Trout Stocked Waters with Closed In-Season Stocking Dates*

The Fly Fishing Only regulation is considered to be socially (not biologically) based because differences in hooking mortality between flies and lures is insignificant. Therefore, restricting anglers to fly fishing gear may not be necessary to achieve biologically based fisheries management objectives. However, the *Fly Fishing Only* regulation may attract more anglers or result in more angler effort than if another regulation were applied.

Opportunity – Management goals and measurable objectives need to be established for streams governed by the *Fly Fishing Only* regulation. This information would assist managers in evaluating regulation success on designated waters and justify management decisions.

Opportunity – The desirability and suitability of continuing the *Fly Fishing Only* regulation should be explored. It is possible that another special regulation (*Seasonal* or *Year Round Trout Conservation Area*, or a *Wild Trout Stream*) might be appropriate. Angler preferences and the need to provide fly fishing anglers with adequate spatial segregation from other types of anglers are factors that should also be taken into consideration.

Opportunity – The Blewett Tract (0.5 miles long) is located within the *Fly Fishing Only* stretch of the Big Flatbrook and is currently singled out for gear restrictions year round. The benefit of having this gear exclusion applicable to a half mile section of the brook for the first 9 days of the spring season is questionable. Consideration should be given to modifying the Blewett Tract regulation to be consistent with the *Fly Fishing Only* regulation on the adjacent sections of the Big Flatbrook.

Opportunity – Trout anglers periodically request that additional streams be regulated as fly fishing only based upon their perception that fish mortality will be reduced. Anglers, particularly those who fly fish for trout, should be made aware of hooking mortality studies that demonstrate that mortality differences between lures and flies is insignificant and the basis for the *Fly Fishing Only* regulation is social not biological.

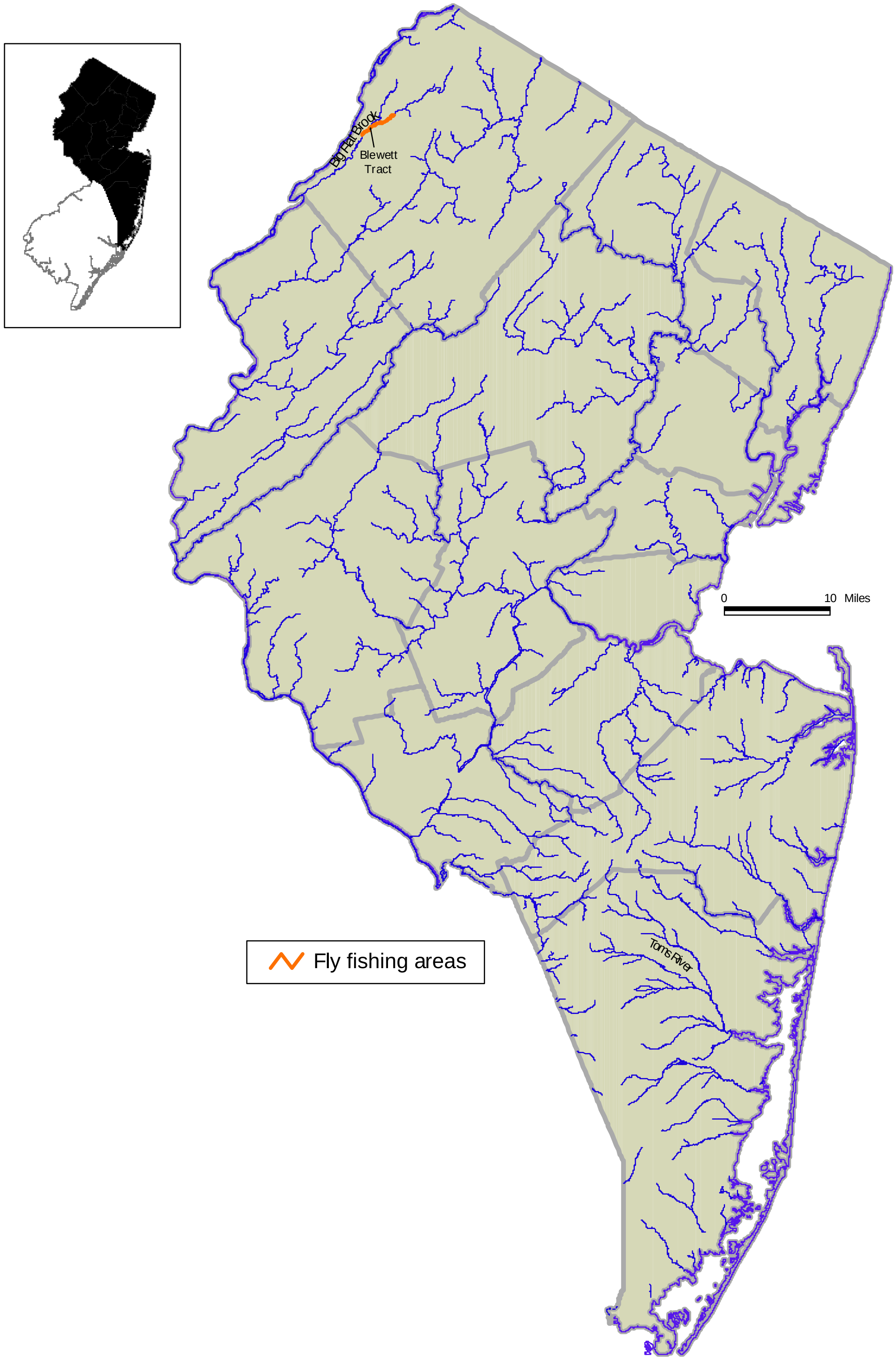


FIGURE 17.— New Jersey streams designated as *Fly Fishing Only Areas*, in 2005.

Trophy Trout Lake Regulation

TROPHY TROUT LAKES REGULATION				
LOCATIONS	**SPECIES**	**SEASON**	**MINIMUM SIZE**	**DAILY LIMIT**
Merrill Creek Reservoir	brown & rainbow trout	January 1 through December 31	15 inches	2
	lake trout	January 1 through September 15 & December 1 through December 31	15 inches	2
Round Valley Reservoir	brown & rainbow trout	January 1 through December 31	15 inches	2
	lake trout	January 1 through September 15 & December 1 through December 31	20 inches	1

<u>Background</u>:

In 1982 special regulations for trout were instituted at Round Valley Reservoir in response to the introduction of lake trout and the excellent fishery for holdover brown and rainbow trout. Initially a 13-inch minimum size, daily limit of two, with no closed season was established for brown and rainbow trout. Anglers were allowed to harvest lake trout, from "opening day" in April through the end of September, and could creel one laker per day, at least 26 inches in size. The season was designed to protect mature adult fish as they congregated over spawning grounds during the fall/early winter spawning period. The minimum size was based upon survey data that indicated 1½ year classes of spawning age lake trout would be protected from harvest.

In 1983 the lake trout minimum size was reduced to 24 inches because of better than expected growth. The harvest period for this species was increased to include the period January through mid-March. The lake trout harvest regulation was modified in 1985 to allow anglers to keep three fish (two measuring 18 – 22 inches and one at least 28 inches) to encourage the removal of an overly abundant year class that was dominating the population. In 1986 the lake trout regulation returned to the 24-inch minimum length, one per day limit.

In 1990 the *Trophy Trout Lake* designation was officially adopted under the Fish Code for Round Valley Reservoir. The minimum size for brown and rainbow trout was increased to 15 inches following a study on growth rates which showed that this increase would prevent catchable trout stocked in the spring from being harvested until after their first summer of growth. Because studies showed that adult lake trout were maturing earlier in the year than originally expected, the closed season was moved to earlier in the fall (September 16th to Nov 30th) to better protect spawning lakers from harvest.

Merrill Creek Reservoir was designated a *Trophy Trout Lake* in 1992 and a 13-inch minimum size (two per day) was established for rainbow trout. Brown trout were not introduced into the reservoir until 1994, at which time the minimum size for brown and rainbow trout was made consistent with Round Valley Reservoir (15 inches). In 1985 Lake Aeroflex (a.k.a. New Wawayanda Lake), a newly acquired public lake, was designated a *Trophy Trout Lake*. Although the lake had a reputation for producing holdover trout, it was found that deep-water trout habitat was limited in the summer due to anoxic conditions. Lake Aeroflex was subsequently reassigned to the *Holdover Trout Lakes* regulation in 1997.

By 1997 annual studies conducted on the fish population in Merrill Creek Reservoir had begun to reveal poor lake trout growth due to a lack of suitable forage (alewives) and overly abundant year classes of lakers. To improve growth rates (by reducing laker biomass) the size limit on lake trout was reduced from 24 to 15 inches and the daily creel limit was increased from one to two fish in 1998. Similar problems with poor condition of lake trout were also observed at Round Valley and in 2001 the minimum size was lowered to 20 inches.

Current Status:

Two lakes, Round Valley and Merrill Creek Reservoirs, are currently designated under the *Trophy Trout Lake* regulation (Figure 18). Trophy trout lakes are stocked by the DFW with catchable rainbow trout and brown trout (1/3 rainbows, 2/3 browns) and fall fingerling lake trout (Merrill Creek Reservoir only). Lakers have not been stocked in Round Valley Reservoir since 1995 because natural reproduction is sufficient to maintain the population. As part of a cooperative study with the DFW, the Round Valley Trout Association, a local angling club, has stocked Kamloops rainbow trout since 2000 to determine if growth rates of this strain surpass that of the rainbows from the Pequest Hatchery.

Currently the lake trout population is monitored annually in the fall at both reservoirs to document size distribution and reproductive success. In addition the attendants at the boat launch facility at Merrill Creek Reservoir monitor angler catch daily through a creel survey (creel surveys have been conducted in 1999 and 2001 at Round Valley Reservoir). Similar to ongoing studies at Merrill Creek Reservoir, a study of the productivity of Round Valley Reservoir is scheduled to begin in 2004.

Opportunity – Management goals and measurable objectives need to be established for lakes governed by the *Trophy Trout Lakes* regulation. This information would assist managers in evaluating regulation success on designated waters and justify management decisions.

Opportunity – The status of the forage base (alewife) at Merrill Creek Reservoir is a concern. Methods for examining alewife population dynamics, and its relation to primary and secondary productivity, should be explored to determine appropriate management strategies.

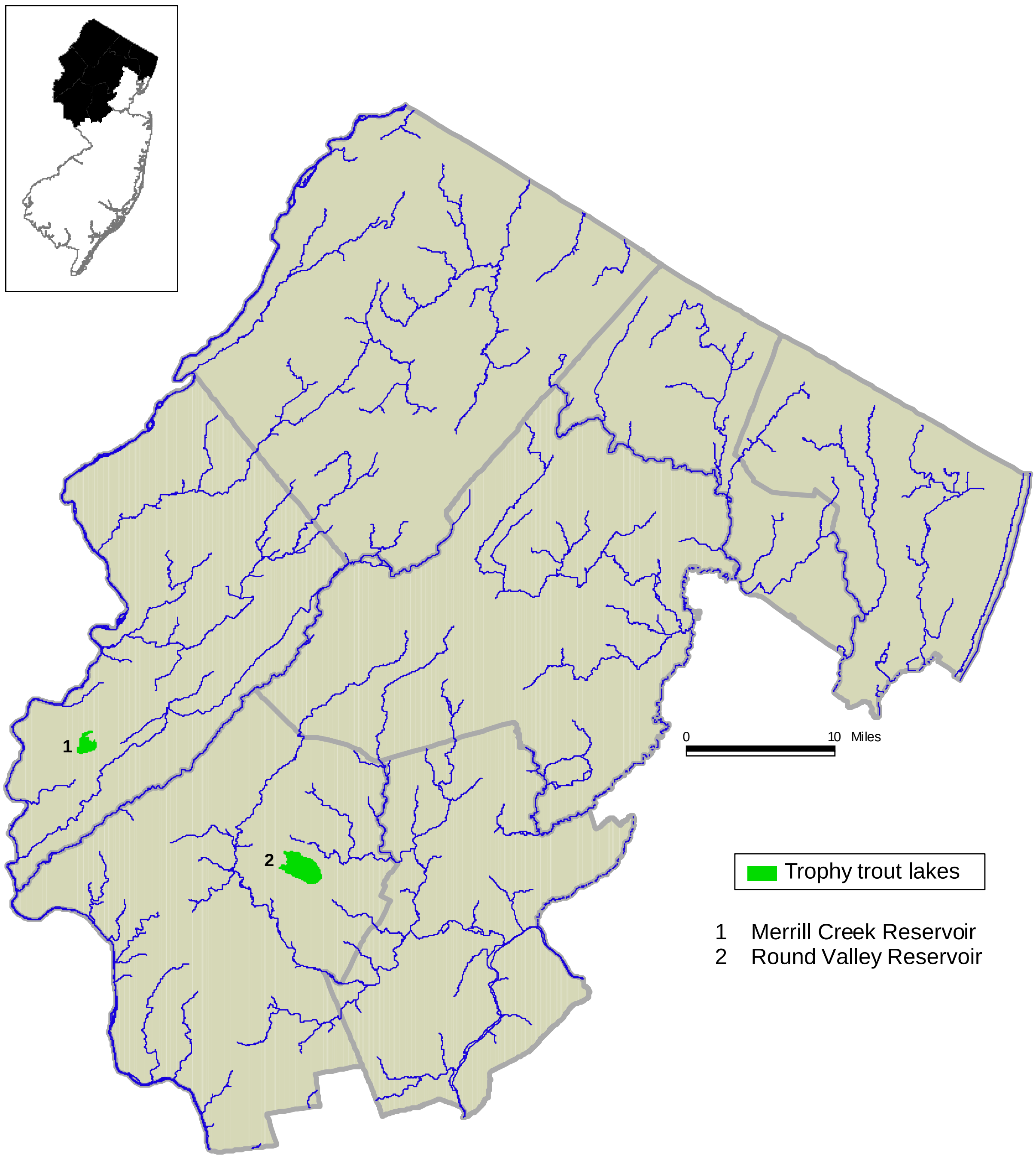


FIGURE 18.— New Jersey lakes designated as *Trophy Trout Lakes* in 2005.

Holdover Trout Lake Regulation

<table>
<tr><th colspan="5">2005 HOLDOVER TROUT LAKE REGULATION -</th></tr>
<tr><th>LOCATIONS</th><th>SPECIES</th><th>SEASON</th><th>MINIMUM SIZE</th><th>DAILY LIMIT</th></tr>
<tr><td rowspan="4">Clinton Reservoir
Lake Aeroflex
Lake Wawayanda
Shepherd Lake
Swartswood Lake
White Lake (Warren Co)</td><td rowspan="4">all trout species</td><td>January 1 through March 20</td><td>7 inches</td><td>2</td></tr>
<tr><td>March 21 to Opening Day at 8 a.m.</td><td colspan="2">Catch & Release Only</td></tr>
<tr><td>Opening Day at 8 a.m. through May 31</td><td>7 inches</td><td>4</td></tr>
<tr><td>June 1 through December 31</td><td>7 inches</td><td>2</td></tr>
</table>

Background: In 1990 a regulation, called "Major Trout Stocked Lakes," was adopted for seven northern lakes and reservoirs (Canistear Reservoir, Clinton Reservoir, Lake Hopatcong, Merrill Creek Reservoir, Monksville Reservoir, Swartswood Lake, and Lake Wawayanda). This regulation was developed to recognize and manage trout-stocked lakes that provided a good fishery for holdover trout. Under this regulation anglers were allowed to fish these waters year round, however harvest was not permitted during the pre-season period. This regulatory change was first recommended to the Council with a reduced creel limit (four from opening day to May 31st, and two thereafter) and no minimum size (consistent with the statewide general regulation at that time). However, the Fish and Game Council modified this part of the recommendation such that the statewide daily creel limit applied (six from opening day to May 31st, and four thereafter), and no more than two of the trout creeled by an angler could exceed 15 inches. Also, the harvest of lake trout at Merrill Creek Reservoir was limited to one fish daily, 24 inches or greater, with no harvest permitted from September 16th through November 30th.

The first change to this regulation occurred in 1992 when Merrill Creek Reservoir was reassigned to the *Trophy Trout Lake* regulation. In 1994 the *Major Trout Stocked Lakes* regulation was renamed *Holdover Trout Lakes* to more adequately reflect the trout management strategy for these lakes. The size limit restriction was eliminated, and the daily creel limit for the split harvest season was reduced from six to four trout, and from four to two trout. Lake Hopatcong was also removed from this special regulation category because recurring summer water quality problems had negatively impacted the lake's ability to produce holdover trout. One year later Canistear Reservoir was dropped from this regulatory category for similar reasons.

In 1997 a seven-inch minimum size for trout was adopted statewide, and this requirement was also incorporated into the holdover trout lake regulation for consistency. The trout fishery in Lake Aeroflex, formerly regulated as a *Trophy Trout Lake* for two years, was judged better suited for the *Holdover Trout Lake* regulation and was switched in 1997. White Lake (Warren County), a private lake with a reputation for producing big holdover brown trout, was purchased by Warren County in 1997 and was designated a Holdover Trout Lake in 2000. No further changes have been made to this regulation since 2000.

Current Status

Currently there are seven waterbodies covered by the *Holdover Trout Lake* regulation in the northern part of the state (Figure 19). These lakes are stocked annually in the spring with catchable brown and rainbow trout (10 – 11 inches). Generally the first stocking (pre-season) consists of rainbow trout and the next three stockings (Weeks 2, 4, and 6) are brown trout. Swartswood Lake has received all brown trout since 1999. Large brood stock trout are not stocked because the stocked catchable trout are able to survive year round and grow to a large size by foraging upon alewives. Whenever possible the hatchery trout are spread out by float-stocking to maximize their long-term survival.

Temperature and dissolved oxygen profiles are annually conducted at each lake in August to evaluate the extent of summer trout habitat. Reductions in the volume of suitable summer trout habitat have occurred in several lakes over time and as a consequence the holdover trout fishery at some lakes is poor, marginal, or unknown. Predation on stocked trout by coolwater and warmwater fish species may also be a significant problem (i.e. Monksville Reservoir). Good documentation and better communication with stakeholders is needed for lakes that are not providing a successful holdover trout fishery to counter angler resistance to change.

Opportunity – Management goals and measurable objectives need to be established for lakes governed by the *Holdover Trout Lakes* regulation. Evaluation procedures (the collection of data to evaluate lake suitability, regulation effectiveness, and determination of stocking rates) are needed in order to assist managers in evaluating regulation success on individual waters and justify management decisions.

Opportunity – Other lakes that support trout year round may be suitable for inclusion under this regulation. Specific criteria, which would assist managers in selecting additional lakes for inclusion under the *Holdover Trout Lake* regulation, need to be established.

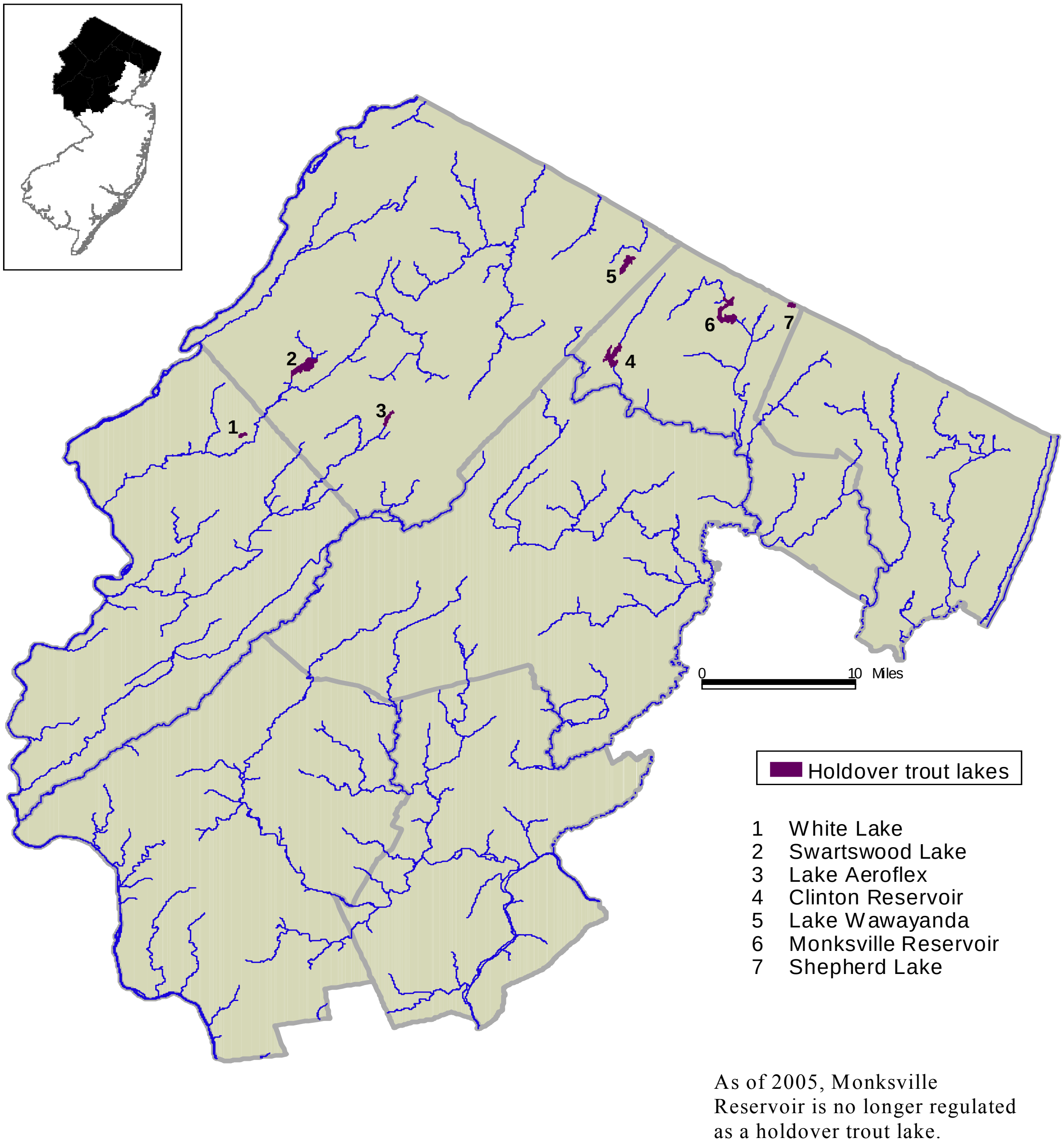


FIGURE 19.— New Jersey waters designated as *Holdover Trout Lakes*, in 2005.

Boundary Waters Regulation

2005 BOUNDARY WATERS REGULATION				
LOCATIONS	**SPECIES**	**SEASON**	**MINIMUM SIZE**	**DAILY LIMIT**
Delaware River (Between NJ and PA)	all trout species	April 16 through September 30 (trout caught at other times must be immediately released)	no min. size	5
Greenwood Lake	all trout species	January 1 through December 31	no min. size	3

Background:

New Jersey and Pennsylvania share the Delaware River and the fishery is co-managed through the Delaware River Fisheries Cooperative (representatives include NY, NJ, PA, and DE state agencies, and the federal government). Between New Jersey and PA, fishing licenses from either state are recognized. The Delaware River, between New Jersey and Pennsylvania, is not stocked with trout by either state.

Greenwood Lake was trout stocked by both New Jersey and New York and produced holdover trout for a number of years until poor summer water conditions caused the demise of the holdover trout fishery. New York discontinued stocking the lake in the early 1990's, and in 1998 New Jersey followed suit after a study documented poor returns of catchable trout stocked in the spring. The trout regulation was left intact to cover the occasional catch of trout that might find their way into the lake. A valid New Jersey or New York fishing license may be used anywhere in the lake.

Current Status:

Two waters, the Delaware River (between New Jersey and Pennsylvania) and Greenwood Lake (between New Jersey and New York) are currently designated as *Boundary Waters* (Figure 20). These waters are not stocked with trout because warm summer water temperatures, the inability to maintain high trout densities through stocking for an attractive put-and-take fishery, and predation of stocked trout by other fishes. However, regulations for trout have been established for these waters to maintain regulatory uniformity, in the event trout are caught. In the Delaware River trout may move in from other areas (further upstream or tributaries).

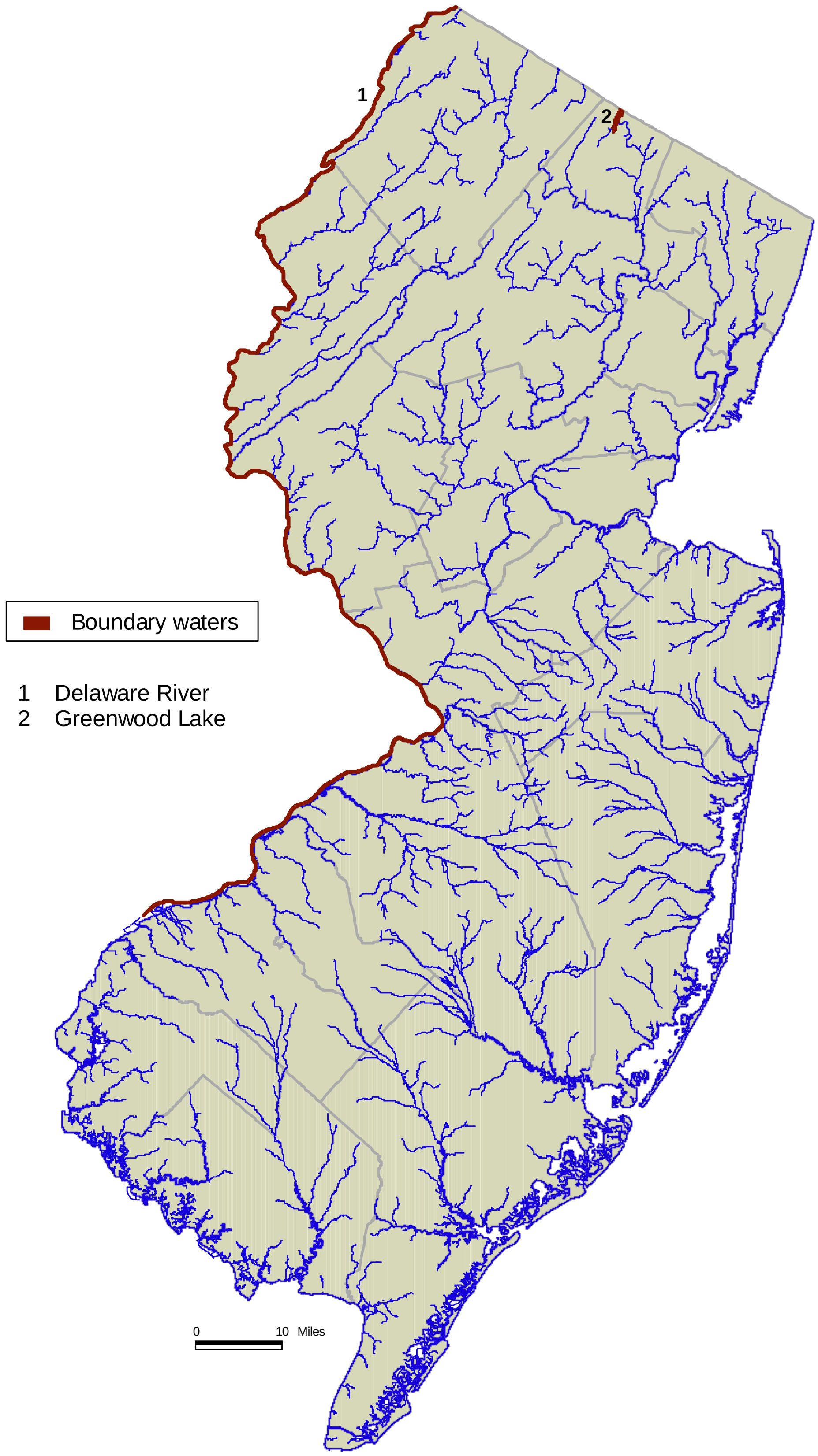


FIGURE 20.— New Jersey waters designated as *Boundary Waters*, in 2005.

Communications and Public Outreach

Overview

The success of any program, no matter the topic, is dependent on communication. This especially holds true in the realm of resource management where there exists a wide array of user groups each with definitive interests. For the DFW, informing anglers in the management, distribution, and propagation of species is critical to the successful management of the state's natural resources. This consistent interaction serves to affirm the DFW's dedication to building and maintaining partnerships with a variety of user groups. Public outreach and partnerships are not only crucial to the success of specific programs but to the future of the DFW as a whole since the DFW operates on dedicated funding generated from the sale of hunting and fishing licenses.

Administratively, the DFW's Bureau of Information and Education is responsible for the dissemination of the majority of information from the DFW, however, all staff, as well as volunteers, hold a responsibility of providing accurate and detailed information to the general public relative to DFW programs. The distribution of information is handled across a variety of forums; including the media, public input and outreach, Internet, programs, publications, and volunteer involvement.

Media

News Releases

The majority of information relative to updates and changes to the management, distribution and propagation of species is disseminated through news releases. Information for news releases is provided to the Bureau of Information and Education personnel who edit the information into a format suitable for publication. Releases are then transferred to the Department's Press Office for review and ultimately the information is disseminated to 72 newspapers and outdoor writers. Press releases are forwarded to Department employees and DFW listserve members. The listserve is a database of persons, voluntarily registered through the DFW's website, who receive email notification when the DFW issues press releases or other informational reminders. There are separate listserve databases for various aspects of DFW program interests.

Television

In 2002 and 2003 the DFW, using marketing programs developed by the Recreational Boating and Fishing Foundation (RBFF), aired 30 second segments on local cable channels reminding viewers of recreational boating opportunities. The segments also included designated free fishing dates.

Radio

As with television, the DFW also aired marketing programs developed by RBFF on local radio stations.

Official Public Notices

Potential regulation changes to the Fish Code require two official public notifications in newspapers serving affected areas. The notifications are solicited for no fewer than 3 business days. Affidavits of the notifications, along with public comments are presented to the Fish and Game Council and the Department of Legal Affairs in the adoption phase of the code**.**

Opportunity **–** Investigate ways to further use multi media sources to reach large target audiences to further emphasize the work being carrying out by the DFW and recreational opportunities available across the State. Look to partner with other agencies such as the Division of Parks and Forestry and NJ Travel and Tourism.

Internet

Division Web Page

The DFW was one of the first of the Department's agencies to join the world wide web with its web page making its debut in 1996. Since its initial debut, this award-winning site has gone through many facelifts. The fishing page is the most popular with 9,000 – 10,000 visits each month. The webpage provides up to date information on DFW programs, stocking information, how to and places to fish. The DFW also provides the purchase of fishing licenses through its web site and beginning in 2005 will go to a fully automated point of sale system.

Opportunity **–** Reconfigure the Bureau's current fishing and Bureau page to a more topic based approach. Also, reformat the information provided to improve the ease at which information can be acquired.

Freshwater Listserve

The Bureau of Information and Education maintains a listserve membership for specific program areas. At no cost, interested parties can subscribe to the program through the DFW's website. Members are automatically sent via e-mail DFW press releases as they become available. The freshwater listserve currently serves approximately 1200 members.

Public Input

Public Trout Meeting

Each year the Bureau of Freshwater Fisheries holds a public meeting at the Pequest Trout Hatchery in Warren County. Information concerning the production, allocation and stocking of trout for the upcoming season is disseminated and feedback from the public is solicited through comment, and a question and answer period. Attendance at the meeting is related to the number of issues and potential controversies occurring within a given year. The proposed allocation and spring stocking schedule is submitted to the Fish and Game Council for approval.

Public Hearing for Fish Code

As part of the rule making process for the adoption of the amendments to the annual fish Code a public meeting is scheduled in the late summer of each year. Proposed amendments to the Fish Code are presented and a public comment period follows. The public hearing is scheduled within the 60 day public comment period but no earlier than 15 days after the proposal appears in the New Jersey Register. Public comments, oral or written are recorded and submitted as part of the adoption phase of the rule.

Freshwater Fisheries Forums

Initiated in 2003, the Freshwater Fisheries Forums were established to further increase public input on freshwater research, management and culture programs. Two forums are held each year, one in the north, in December, and the other in the south, in February, permitting anglers throughout the state an opportunity to comment. The forums consist of a broad range of topics relative to the state's aquatic resources and include an extensive open panel discussion

Public Outreach

Open House

Each year the DFW holds a two-day Open House at the Pequest Trout Hatchery. The event is historically scheduled the weekend prior to the opening day of trout season. Various facets of the DFW are represented and the event takes on a carnival air. Tours of the hatchery are provided as well as many displays depicting DFW programs and on-going research. The Bureau of Freshwater Fisheries gill net maze in an extremely popular attraction and the Jr. biologist quiz adds a learning component about the state's fisheries resources for the state's junior anglers.

Opportunity – The Open House has become a popular family event and is usually not attended by the more avid anglers. Scheduled for the first weekend in April the weather is usually uncooperative and greatly effects turnout. Investigate moving the event to coordinate with the Free Fishing Days and use the opportunity to solicit future potential anglers. In addition, provide scheduled programs throughout the day on the basics of fishing.

Sportsmen's Shows

The DFW of Fish and Wildlife sends representatives to a number of scheduled sportsmen shows across the state each year. The shows permit face to face interaction between the DFW and its large constituent base. The DFW also uses this opportunity to sell licenses at the convenience to the sportsmen.

Trout Stocking Hotline

Initiated in 1993 the trout stocking hotline was developed in order to provide anglers with the day to day schedule during the spring and fall stocking period. Callers select the week and the list by waterbodies being stocked each day is given. The hotline now provides stocking information for fall and winter periods. The hotline successfully provides anglers access to stocking information at any time of day particularly to those who do not have Internet access. The hotline also reduces staff time in responding to the numerous phone calls about stocking locations. Updates to the hotline can be made from remote from field locations.

Personal communications with staff

The Bureau of Freshwater Fisheries prides itself with the ease at which its large constituent base can reach personnel. Direct numbers to staff and associated facilities appear on the web page. Many personnel have continual direct communications with contacts with numerous organizations. This serves to further the excellent partnerships which have developed over the years and enhance the management of the state's resources. Field offices maintain an open door approach for anglers to stop by and interact with staff.

Written communication

As the DFW works with many facets of its user base so written communication is presented in many forms. Press releases provide current information to newspapers and writers who then relay the information to their subscribers. Survey results, technical reports, and statewide management plans provide results of on-going research, insight to management decisions, and provide the future focus and strategy in the management of the state's aquatic resources. The articles written for the digest and the website relay this information as it becomes available in addition to providing information on recreational opportunities across the state. DFW staff also responds to thousands of letters each year submitted by sportsmen, landowners, municipalities, environmental organizations, other agencies, and the general public.

Publications

NJ Fish and Wildlife Digest

The award-winning digest includes regulations, program updates, informational articles, and results of on-going research. The publication also includes upcoming DFW events. Four issues, each pertaining to different focus areas are prepared for publication each year. The issue pertaining to freshwater fishing is released in December of each year. The digest is distributed free of charge when purchasing a license and upon request. Over 185,000 copies of the freshwater issue are distributed each year making it the largest distributed document within the Department. In 1995, in an effort to off shoot rising printing costs commercial advertisements were added to the digest format. Presently, the advertising covers the entire cost of printing the digest and further demonstrates the way the DFW continues responsible fiscal management.

Places to Fish

Perhaps one of the most popular and informative documents currently provided by the DFW relative to freshwater fishing opportunities is Places to Fish. The brochure provides information on over 200 public waterbodies across the state by county. The tabular format provides easy reference on the location, size and ownership of waterbodies. It designates the waterbodies stocked with trout, as well as an index of the opportunities each waterbody has for a number of popular game species. Waterbodies are considered for inclusion in the document based on the amount of available access as well as the amount of fishing pressure the waterbody is deemed able to handle.

Pamphlets

The DFW also provides for distribution a number of small pamphlets directed at specific program and access areas. Topics include but are not limited to trophy trout lakes, Delaware River access sites, Pequest Trout hatchery operations and educational programs.

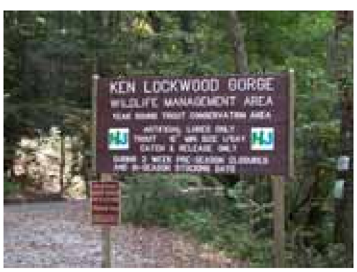
Opportunity – Prepare a pamphlet directed at trout fishing opportunities across the entire state. Using GIS maps developed for this plan include maps with location of trout stocked waters, wild trout streams and trout conservation areas. Include general regulation and special regulation areas.

Angler Surveys

Angler surveys are an extremely valuable tool for providing communication between natural resource managers and recreational users. The surveys are accomplished in a variety of formats depending on the intent of the survey. Surveys have been used to measure angler use, effectiveness of regulations, species harvest and angler preferences and attitudes. Surveys are accomplished in a variety of formats depending on the type of information sought.

Signs & Kiosks

Signs and kiosks posted along waterbodies and at the entrance of access areas provide



anglers with stocking information, access location, regulation information, research studies and consumption advisories. Used with discretion so as not to detract from the aesthetics of the area they provide a service to anglers in alerting them to information specific for the waterbody, particularly when regulations are different from the statewide regulations. Informational signs are extremely valuable for research projects where angler participation is critical to the success of the study such as growth and harvest studies where anglers are needed to report their catch.

Opportunity – Identify waters with high recreational use and construct, install and keep current informational kiosks at these locations to inform anglers, and other recreational users of recreational opportunities and the rules and regulations protecting our natural resource areas.

Difficulties do arise when posted signs are in direct contradiction of one another, which most often occurs with trout stocked waters signs and landowner placed no trespassing signs. A number of trout stocking points are privately owned. The DFW will stock private property provided angling access is provided to the general public. However, due to liability concerns a number of these areas are also posted as "No Trespassing" by the same owners. Although the DFW promotes an "Ask First" ethic, the contradicting signs can be problematic, particularly for anglers unfamiliar with a particular stream segment. Contacting the respective landowner is often difficult since the location of the residence is not always obvious.

<u>Opportunity</u> – Investigate modifying trout stocked water signs to depict access is allowed strictly for the purposes of fishing. Discontinue stocking in areas where access issues continue to be problematic.

Signs can also be used to advertise DFW programs, recreational opportunities and events. In 2003, the Bureau of Information and Education acquired a digital color image system which produces large scale vinyl decals. This equipment has proven to be invaluable as a marking tool to the DFW. Combined with the Recreational Boating and Fishing Foundation's Water Works Wonder campaign hatchery trucks were outfitted with large-scale postings promoting fishing. The trucks are highly visible as they travel thousands of miles across the state along scheduled stocking routes.

<u>Opportunity</u> – Continue to investigate ways to use current equipment and vehicles to promote DFW activities.

Programs

State Record Fish

The State of New Jersey currently has state records documented for 30 species of freshwater fish. Fish must be caught by legal methods within the State and its boundary waters. Fish are based on weight. Anglers who have caught a potential state record must have the fish weighed on a certified scale with a valid certification. The fish must be submitted to state fisheries biologists for species verification. An application, requesting general information about the angler and fish, in addition to location and signature and scale certification of the business weighing the fish. The application is then submitted to the DFW for review. Current state records for trout species include:

Brown trout	21 pounds 6 ounces	Round Valley Reservoir
Rainbow trout	13 pounds 0 ounces	Lake Hopatcong
Brook trout	7 pounds 3 ounces	Rockaway River
Lake trout	32 pounds 0 ounces	Round Valley Reservoir

Skillful Angler Awards Program

Developed in 1983 the skillful anglers awards program provides a way for recognizing fish which may not contend with current state records but are nonetheless significant catches by anglers. The program not only recognizes the skills of the angler but also the success of DFW stocking and management programs.

The program is administered by the DFW’s Bureau of Information and Education. There are minimum weights assigned to each particular species which must be caught by hook and line. An application must be submitted for review and includes information relative to the angler and the date and location where the fish was captured. Signature of the business or agency weighing the fish is also required. If any doubt exists as to the proper identification of the fish a statement from a state fisheries biologist must be included. Each angler successfully meeting the requirements is issued a bronze pin and a certificate from the DFW. The largest fish in each category each year is awarded an engraved fillet knife.

For the 2004 fishing season the DFW’s Skillful Angler Awards Program was modified to include a catch and release category, based on fish length, and a junior category for anglers under the age of 16. The minimum weight for lake trout was increased from 8 pounds to 12 pounds. The minimum requirements for the Skillful Angler Awards Program for New Jersey’s coldwater species are as follows:

Species	Adult Weight (lbs., ozs.)	Junior Weight (lbs., ozs.)	Catch and Release (inches)
Brook trout	3	2	19
Brown trout	8	5	25
Rainbow trout	5	3 lbs., 8 ozs.	23
Lake trout	12	8	31

It is acknowledged, with the exception of lake trout or browns from large reservoirs, fish caught meeting the above size requirements are typically a result of the stocking of broodstock from the Pequest hatchery.

Opportunity **–** Investigate a catch and release and a junior component to compliment the current Skillful Angler Awards program.

Free Fishing Days

The DFW offers one weekend each year in which licenses are not required to fish in the state. The purpose of the program is to provide an opportunity for residents which may have an interest in fishing but want to try it before actually having to purchase a license. The days are usually scheduled in June.

Opportunity – Investigate the feasibility of adding additional free fishing days during the fall of each year.

Educational Programs

The Bureau of Information and Education provides numerous education programs throughout the year to the general public and through schools. The programs cover a variety of topics including but not limited to basic fishing, fly fishing for beginners, intermediate fly fishing, and fly tying for beginners. Assistance with these programs is coordinated through the DFW's extensive volunteer program and organized sportsmen groups. This coordination not only cuts program costs considerably it also furthers important partnerships between the DFW and interest groups. The focus of many of the programs is also to introduce people of all ages to the recreational sport of fishing in the State of New Jersey.

Children's Derby Program

Of particular success of the DFW's educational programs is the Children's Derby program coordinated through the Hackettstown hatchery. In 2005, 117 events were held reaching out to over 25,000 children and their parents. The program's focus is to introduce children and their families to fishing and increase awareness of local fishing opportunities. The program is coordinated through local municipalities, law enforcement agencies and special interest groups. DFW personnel present information on DFW activities and general fish identification and handling. An added bonus to the program is children assist staff in stocking fish into their local waters. The DFW's law enforcement officers also participate in a number of the derby programs with its Hooked On Fishing Not On Drugs campaign.

Volunteer Program

The DFW would not be able to run a number of its programs if it was not for the dedicated support of its extensive volunteer force. Volunteers are used in just about every facet of DFW operations including, but not limited, to clerical, educational programs, stocking, deer check, field sampling, and habitat improvement projects. The program continues to foster a good working relationship with sportsmen and the general public. Currently, the Wildlife Conservation Corp has 1200 members.

Workshops

Occasionally, the DFW will partner with other agencies and conservation groups to host workshops on specific topic areas. One of the most successful is the Stream Habitat Workshop typically held in November. The DFW partners with other government and non-government agencies for the one-day workshop. There is a half-day classroom instruction on types of stream bank stabilization techniques and in-stream habitat enhancement. The afternoon session is hands on and entails installing actual structures and learned techniques on a nearby stream. The workshop is designed to provide insight to conservation organizations, municipal officials, and landowners that may be interested in instituting similar rehabilitation projects.

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Funding

Overview

Unlike other Divisions within the Department of Environmental Protection, the majority of the DFW's budget is supported through dedicated funds generated from the sale of hunting and fishing licenses. Through it's 125-year history, the DFW had not received State treasury funds for general operations. However, in 2005 due to a continued long term decline in it's funding base the State Legislature appropriated $ 4.2 million to the DFW.

Due to its dedicated funding base, the DFW receives Federal monies from excise taxes of manufacturers of hunting and fishing equipment. Although the DFW operates on funding derived from the State's over 200,000 licensed sportsmen the protection and management of the state's natural resources are a benefit to each and every one of the state's 8 million residents. Recreational activities focused around the state's natural resources generate over $2.2 billion dollars to the state's economy each year (USFWS 2001).

The propagation, management and protection of the State's aquatic resources are supported by the Hunters and Anglers Fund, comprised of license and stamp sales, the Federal Sportfish Restoration Program, and additional grants received for specific research projects. The sale of freshwater fishing licenses and trout stamps generates over $4 million dollars annually to the DFW's Hunters and Anglers Fund.

Revenue Sources for the Division of Fish and Wildlife

The DFW unlike other Department of Environmental Protection agencies is funded through dedicated funds generated from the sale of hunting and fishing licenses and permits. Revenues generated from license and permit sales comprise over 70% of the DFW's budget. In addition, the DFW receives Federal Aid monies generated from excise taxes on hunting and fishing equipment (Dingell-Johnson Act (1950)). This "user-pays" system has made great strides in financing the management of New Jersey's fish and wildlife resources, not only to the benefit of licensed hunters and anglers but to every one of the state's over 8 million residents. In addition, wildlife associated recreation generates $2.2 billion dollars into the state's economy each year, with an estimated 300,000 freshwater anglers (resident , non-resident and unlicensed anglers) generating $138 million dollars alone.

Two DFW programs, Marine Fisheries and the Endangered and Nongame Species Program, receive money from alternate funding sources. The Endangered and Nongame Species Program is funded only through a check-off on state income tax return forms, Federal grants, and the sale of Conserve Wildlife license plates. Although New Jersey's endangered and nongame wildlife generates millions in ecotourism, there is no stable, dedicated source of funding to ensure their protection.

The Marine Fisheries Program receives only a small fraction of its total funding from commercial license and landing fees. The marine fish and shellfish programs, which help generate billions in economic benefits to the state, are supported with only a $1.3 million state appropriation. They are the only DFW program areas which receives general treasury funds on an annual basis. During 2001, the Marine Fisheries Administration budget totaled approximately $3.0 million. This includes $1.3 million in state apropriation, $1.6 million in Federal grants and $250,000 in finfish and shellfish license fees. Of the 14 Atlantic coastal states, New Jersey is third in recreational importance and sixth in commercial importance when ranked in value of its fisheries. However, it ranks 12th in the amount of State funding for marine programs.

Hunter and Angler Fund

Over 70% of the DFW's annual budget is generated from the sale of hunting and fishing licenses and permits. Revenues collected are deposited in a dedicated account known as the Hunter and Angler fund. The sale of freshwater fishing licenses and trout stamps currently generates over $4 million dollars annually, while hunting licenses and permits generate approximately $4.5 million.

<u>Freshwater Fishing License</u>

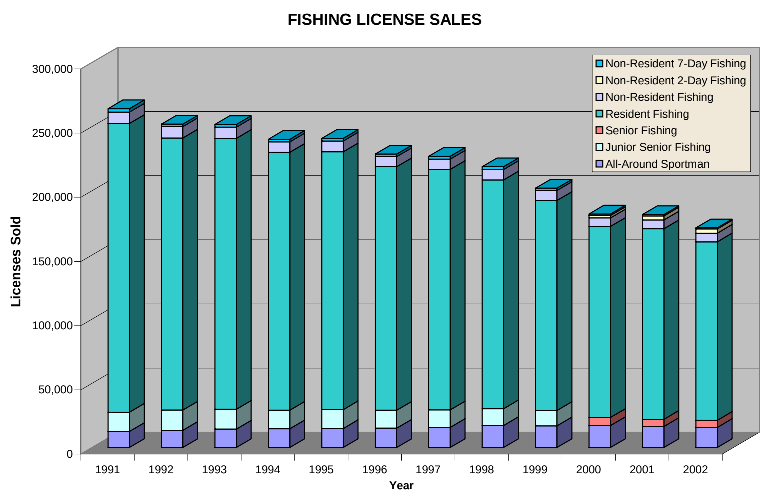
The requirement to purchase a license to fish in freshwater in New Jersey began in 1915, with a $1.15 license which allowed residents to hunt or fish within the state. In 1933, a separate fishing license was offered at $2.15, a one-dollar savings from the combination hunting and fishing license being offered at $3.15. Over the last 89 years there have been 16 increases in the cost of an angling license and a vast array of various licenses offered (Table 10). Although sportsmen were solicited each time for support and necessity for the added costs, each increase often resulted in a decline in the number of persons purchasing a license. The most recent change in licensing requirements in 2000 was no exception when a resident angling license increased from $16.00 to $22.50. At the same time the license age was increased to 16 which also effects current license sales figures.

TABLE 10.— Cost of resident freshwater fishing licenses and trout stamps by year .

Year	Cost of Resident License (US $)	Trout Stamp	Comment
1915	1.15		Hunting & fishing license
1922	1.65		Hunting & fishing license
1932	3.15		Hunting & fishing license
1933*	2.15		Fishing license
1948	3.15		
1953	3.15	1.00	
1961	4.15	2.00	
1972	6.25	2.00	
1976	7.25	4.00	
1981	9.50	4.00	
1983	11.25	4.75	
1985	12.25	5.25	

1991	12.25	6.25	
1992	15.00	7.00	
1994	16.50	7.75	
2001	22.50	10.50	

Since 1991 there has been a 41% decline in fishing license sales. Considering within this same time frame New Jersey anglers have benefited from successful management and stocking programs which have led to opportunities for walleyes, tiger muskies, northern pike, and muskellunge, in addition to an already successful trout stocking program, makes this decline even more disturbing. Fishing literally in New Jersey has never been better, yet participation continues to decline. A survey of anglers, completed in August of 2004, indicated that time constraints, either family or work related, were the primary reasons people did not purchase a license in 2003. Only 2% of anglers indicated that cost was the reason they did not purchase a license in 2003. The survey also indicated that 40% of anglers fished less than 20 times a year, with 22% fishing 9 days or less. As anglers find less and less time to fish the cost of a license may influence their decision to purchase a license in the future.



Currently, the DFW is implementing a Point-Of-Sale computerized licensing purchasing system. The system will result in a computerized database of its license buyers. This information will prove invaluable in targeting programs, marketing and general information to its constituents.

Opportunity – Coordinate with the Bureau of Information and Education to develop and implement an advertising and public relations campaign to increase participation in coldwater fishing.

Opportunity – Investigate ways to increase angler participation by providing innovative license purchasing opportunities.

Presently, anyone 16 years of age and older must have a valid license to fish (with a handline, rod and line, or bow and arrow) in New Jersey's publicly and privately owned freshwater ponds, lakes, rivers, streams, and canals. In addition to a fishing license, a trout stamp is required of residents (16 – 69 years of age) and nonresidents (age 16 and older) in order to take, attempt to take, possess or kill trout. Exceptions to these licensing requirements include residents age 70 and older, farmers, eligible National Guard personnel, residents afflicted with total blindness, and individuals fishing at licensed fishing preserves. Licenses are valid from time of issue through the end of the calendar year and may be purchased from regional DFW offices, designated agents (sporting goods stores) or over the internet. Current licensing requirements and fees are summarized in Table 11. Changes to licensing requirements and fees requires legislative action.

TABLE 11.— New Jersey freshwater fishing license and trout stamp requirements and fees, in effect during 2005. Licenses and stamps are valid from date of purchase to December 31st, unless otherwise indicated.

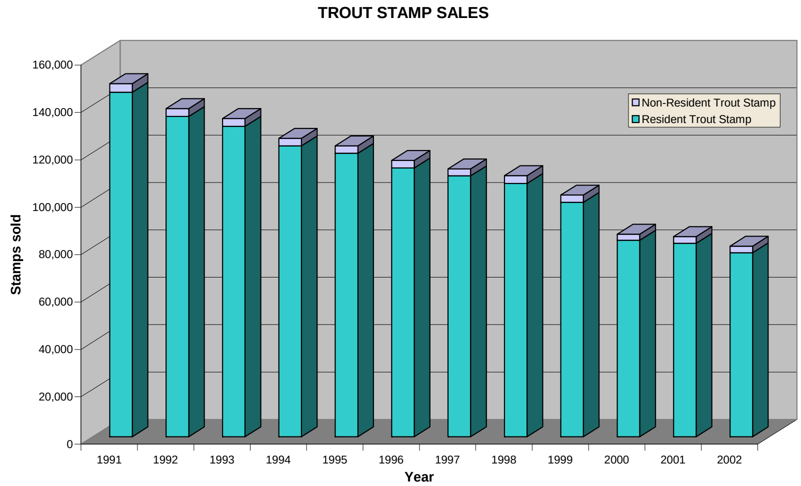
Residency		**Age**	**Fishing License**	**Trout stamp**
Resident (must have lived in the state for 6 months immediately prior to the time of application)		under 16 years	not required	not required
		16 – 64 years old	$22.50	$10.50
		65 – 69 years old	$12.50	
		70 years and older	not required	not required
Resident (All-Around Sportsman[1])		16 years old and older	$72.25	$10.50
Non-resident		under 16 years	not required	not required
		16 years old and older	$34.00	$20.00
Non-resident (Vacation)	2-Day	16 years old and older	$9.00	$20.00
	7-Day		$19.50	$20.00

[1] Includes resident fishing, firearm hunting, and bow & arrow hunting licenses (trout stamp not required for age 70 and older).

Trout Stamp

In addition to a fishing license, a trout stamp is required of residents (16 – 69 years of age) and nonresidents (age 16 and older) in order to take, attempt to take, possess or kill trout. Trout stamps, as with fishing licenses are issued through the end of the calendar year and may be purchased from regional DFW offices, designated agents (sporting goods stores) or over the internet. The state currently sells over 77,000 trout stamps each year, indicating that over 60% of licensed anglers fish for trout.

Initiated in 1953, the revenue from trout stamp sales was designed to offset the additional costs of raising and stocking trout. Since a number of anglers do not fish for trout a separate stamp was warranted. Currently trout stamp sales generate approximately $850,000 in revenue each year and are used to offset the $1.5 million costs incurred with the raising and stocking of 770,000 trout each year. As with license sales, there has been a steady decline in the numbers of trout stamps sold over the past ten years.



Opportunity – Prepare a publication identifying the extensive trout fishing opportunities that exist within the state. To offset costs investigate possible funding sources such as commercial entities, private grants, Department of Tourism to assist with publishing costs.

Federal grants

Sportfish Restoration Program

In addition to license revenues the DFW receives Federal monies each year. For the Bureau of Freshwater Fisheries this money is allocated through the Federal Aid in Sport Fish Restoration Program. The program, established from an amendment to the Dingell-Johnson Act of 1950, provides states funds for the management, conservation and restoration of fishery resources. The Sport Fish Restoration program is funded by revenues collected by the manufacturers of fishing rods, reels, creels, lures, who pay an excise tax on these items to the U.S. Treasury. An amendment in 1984, Wallop-Breaux, added new provisions to the Act by extending the excise tax to previously untaxed items of sport fishing equipment. Each state's share is based upon the number of license anglers (60%), and land and water area (40%). No state receives more than 5 percent or less than 1 percent of each year's total apportionment. The program is a cost-reimbursement program, where the state covers the full amount of the approved project then applies for reimbursement for up to 75% of project expenses.

The Bureau of Freshwater Fisheries currently receives approximately $800,000 dollars through the Sportfish Restoration program. Of this amount, $600,000 is allocated to support put and take, and delayed take fisheries programs (F-50-D). The remaining $200,000 supports current research and management programs (F-48-R). Sportfish Restoration programs run on a five-year grant cycle.

GRANT F-48-R-18 *(covering the period November 1, 2003 - October 31, 2004)*
Investigations and Management of New Jersey's Freshwater Fisheries Resources

Project I	**Investigations and Management of Anadromous Fisheries**		
Job No. I-1:	Delaware River American Shad Population Estimate		
Annual Job Costs:	State	Federal	Total
	$5,250	$15,750	$21,000
Job No.I-2:	Delaware River Juvenile American Shad Outmigration		
Annual Job Costs:	State	Federal	Total
	$4,000	$12,000	$16,000
Job No.I-5:	American Shad Restoration in the Raritan River		
Annual Job Costs:	State	Federal	Total
	$8,500	$25,500	$34,000
Job No.I-7	Inventory and Status of Anadromous Clupeid Spawning Migrations in New Jersey Freshwaters		
Annual Job Costs:	State	Federal	Total
	$4,750	$14,250	$19,000
Project II	**Investigations and Management of Coldwater Fisheries**		
Job II-2:	Classification of New Jersey Trout Waters		
Annual Job Costs:	State	Federal	Total
	$1,250	$3,750	$5,000
Job II-6:	Development of a Coldwater Fisheries Management		
Annual Job Costs:	State	Federal	Total
	$1,125	$3,375	$4,500
Job II-7:	Inventory of Trout Production Streams		
Annual Job Costs:	State	Federal	Total
	$3,750	$11,250	$15,000
Job II-8:	Round Valley Reservoir-Nutrient and Plankton Study		
Annual Job Costs:	State	Federal	Total
	$13,000	$39,000	$52,000
Job II-9	Fish Habitat Improvement in New Jersey Streams		
Annual Job Costs:	State	Federal	Total
	$1,500	$4,500	$6,000
Project III	**Investigations and Management of Warm and Coolwater Fisheries**		
Job III-1	Inventory of New Jersey Lakes		
Annual Job Costs:	State	Federal	Total
	$10,000	$30,000	$40,000
Job III-10	Fish Habitat Improvement in New Jersey Lakes		
Annual Job Costs:	State	Federal	Total
	$1,000	$3,000	$4,000

GRANT F-50-D-19 *(covering the period January 1, 2004 - December 31, 2004)*
Fish Culture and Stocking Program

Project I	**Delayed Take Stocking**		
Job No. I-1:	Delayed Take Stocking		
Annual Job Costs:	State	Federal	Total
	$122,000	$366,000	$488,000
Project II	**Put and Take Fisheries**		
Job No. II-1:	Put and Take Fisheries - Pequest		
Annual Job Costs:	State	Federal	Total
	$61,744	$185,233	$246,977
Job No. II-2:	Children's Derby Program		
Annual Job Costs:	State	Federal	Total
	$16,256	$48,767	$65,023

Miscellaneous Grants

Other Federal grants

In addition to monies received annually through the Sportfish Restoration Program the DFW also submits proposals for other federally funded grants for specific research projects. In 2004, the Bureau of Freshwater Fisheries received a $200,000 grant, from the State Wildlife Grants program, to investigate the status and distribution of non-game fishes within the State. This project will assist in defining the distribution of approximately 40 species of nongame species. These species also include trout associated species such as slimy sculpin, longnose dace, and blacknose dace. The Bureau also submitted a proposal and received a $100,000 grant, from the Wildlife Conservation and Restoration Program, to document the presence of eggs and larval forms of the Federally endangered shortnose sturgeon within the Delaware River.

In 2001, the Bureau of Freshwater Fisheries received a grant from a Reverted Sportfish Restoration Account to characterize New Jersey's wild brook trout populations using molecular genetics. The project was one of only 27 proposals funded out of 168 submissions. The intent of the study is to determine if genetically unique populations of wild brook trout occur in New Jersey. If genetically unique populations are found to exist then management strategies can be developed and implemented to preserve, conserve and restore this valuable resource. The 250 blood samples collected are being analyzed using micro-satellite DNA technology.

Other Federal Grants

Shortnose sturgeon			
Annual Job Costs:	State $25,000	Federal $75,000	Total $100,000
Nongame Fishes			
Annual Job Costs:	State $50,000	Federal $150,000	Total $200,000
Brook Trout Genetics Study			
Annual Job Costs:	State $6,750	Federal $20,250	Total $27,000

<u>Other State grants</u>
In 2000, the Bureau of Freshwater Fisheries received a $18,000 grant from the GEMS Ground Water Damages Account to initiate the brook trout genetics project. This grant is still active.

Other State Grants

Brook Trout Genetics Study			
Annual Job Costs:	State $18,000		Total $18,000

Program Goals and Strategies

Overview

Despite the long history and evolution of trout management with the State of New Jersey there has never been a long term, strategic plan formulated to address the myriad of issues surrounding the state's fragile coldwater resources. The lack of long range goals and objectives leads to a "reactionary" approach to fisheries management. The first phase of implementing a strategic approach to effective management, regardless of topic area, is the identification of specific goals. Identified below are goals as they relate to the DFW's activities on coldwater management. Strategies for achieving the desired goals are then established with specific opportunities identified for implementation. These opportunities are identified throughout the plan and are a fitting example of the variety of issues facing the state's aquatic resources today. A timeline for the implementation of specific strategies and opportunities is found in the operational section.

GOAL 1 Protect, restore, and enhance coldwater fish habitat and ecosystems.

Strategy 1.1 Continue to inventory and classify waters according to their suitability for trout, and provide recommendations for surface water classification changes to the Department of Environmental Protection.

<u>Opportunity</u> – Interpolate data collected for Incidence of Occurrence development to determine if any modification to the Incidence is required to reduce the sampling distance from 182 meters to 150 meters. The reduction of sampling distance would allow for consistent sampling protocols between various research projects. (Classification)

Strategy 1.2 Identify and protect important coldwater fish habitat and ecosystems.

<u>Opportunity</u> – Identify habitats and ecosystem types that support wild trout and are in danger of being lost or drastically altered. Explore ways to protect landscapes in which wild trout occur through links with management initiatives for other biotic resources (plants, birds, herptiles, etc.). (Wild Trout Management)

<u>Opportunity</u> – Determine if there are linkages between wild trout populations and topographic characteristics (gradient and elevation), soils, land-use, physicochemical characteristics, and other features to develop a tool for identifying potential or historical wild trout habitat. (Wild Trout Management)

Opportunity – Prioritize trout production streams for the purpose of acquisition and/or easements to provide to the NJDEP Green Acres Program. (Wild Trout Management and Habitat Management)

Opportunity – Use existing or available water chemistry and geology data to identify trout streams that are potentially high in productivity and may have the potential to provide a more desirable fishery in terms of fish size or quantity through specialized management. (Habitat Management)

Strategy 1.3 Continue to interact with other state agencies on operational, regulatory, and land-use issues to ensure adequate consideration is given to coldwater fish resources. To this end, continue to participate in the review of Land Use Applications that have the potential to impact wild trout populations.

Opportunity – The DFW should work closely with the N. J. Division of Parks and Forestry to determine if operational changes regarding the hypolimnetic aeration system at Swartswood Lake would result in an improvement in summer trout habitat. (Habitat Management)

Strategy 1.4 Develop and implement a habitat improvement and restoration program.

Opportunity – Investigate the feasibility of using Natural Resources Damages money to fund a staff position dedicated to the restoration and enhancement of coldwater fish habitat. (Habitat Management)

Opportunity – Identify land-use changes that have historically and currently affect wild trout with the intention of improving and restoring healthy wild trout populations. (Wild Trout Management)

Strategy 1.5 Continue to develop partnerships with fishing and conservation oriented organizations to increase conservation and restoration efforts on streams and lakes that provide trout fishing opportunities.

Strategy 1.6 Monitor changes in water quality on specific waterways where summer trout habitat may be in jeopardy due to declining water quality

Opportunity – The amount of available summer trout habitat reaches critical levels on some designated lakes and annual monitoring activities are essential. Historical data (temperature and dissolved oxygen profiles) for each lake should be compiled into a report and thereafter a yearly report prepared and disseminated. Open and candid communication with angling organizations, agencies, lake owners and other stakeholder groups concerned about water quality issues is desirable.

Strategy 1.7 Monitor and develop management strategies for coldwater fisheries in large reservoirs.

Opportunity – The status of the forage base (alewife) at Merrill Creek Reservoir is a concern. Methods for examining alewife population dynamics, and its relation to primary and secondary productivity, should be explored to determine appropriate management strategies. (Fish Regulations)

GOAL 2 Conserve and enhance wild trout populations at optimal levels.

Strategy 2.1 Routinely monitor fish populations, including wild trout, in order to keep management strategies current, aid in the identification of resource problems and issues, and demonstrate agency commitment to the management of aquatic resources.

Opportunity – Prioritize and establish a monitoring schedule for wild trout populations. (Wild Trout Management)

Opportunity – Prepare and implement a research project to document the growth on naturally occurring brook, brown, and rainbow trout populations throughout the entire state. (Life History)

Opportunity – Maintain an inventory of wild trout populations (and their aquatic habitats) in a computerized database so species distributions can be mapped and information readily retrieved. (Wild Trout Management)

Opportunity – Identify habitats and ecosystem types that support wild trout and are in danger of being lost or drastically altered and explore ways to protect the landscapes in which wild trout occur through links with other wildlife (plants, birds, herptiles, etc.). (Habitat Management)

Opportunity – Investigate the feasibility of testing wild trout populations for the presence of pathogens known to be a concern to coldwater trout species. These include but are not limited to IPN (infectious pancreatic necrosis), VHS (viral hemorrhagic septicemia), and IHN (infectious hematopoietic necrosis) viruses, *Aeromonas salmonicida* (furunculosis), *Renibacterium salmoninarum* (bacterial kidney disease), *Yersinia ruckeri* (enteric redmouth), and *Myxobolus cerebralis* (whirling disease (Fish Health)

Strategy 2.2 Develop management strategies to assure the protection of the State's valuable wild coldwater fish populations.

Opportunity – Develop and implement a plan specific to management of brook trout, New Jersey's state fish and only native salmonid. (Wild Trout Management)

Opportunity – Determine if populations of wild (heritage) brook trout inhabit New Jersey waters and develop strategies to conserve and protect this native fish and its habitat. (Wild Trout Management)

Strategy 2.3 Evaluate current management practices which may negatively impact wild trout populations.

Opportunity – Through review of scientific literature and field sampling the impacts of stocking cultured trout in small trout production streams should be investigated to determine if alternative stocking practices are warranted. (Cultured Trout Management)

Strategy 2.4 Protect wild trout populations through the use of established fishing regulations.

Opportunity – Determine if the statewide *General Trout Regulation* governing approximately 140 trout production streams (not covered by special regulations) provides a satisfactory level of protection from over-exploitation by anglers. (Fishing Regulations)

Opportunity – Evaluate trout production streams currently regulated as *Wild Trout Streams*, *Trout Conservation Areas*, and *Fly Fishing Only Areas* to determine if existing fishing regulations provide for appropriate level of recreation that is consistent with maintaining viable wild trout populations. (Wild Trout Management)

GOAL 3 Provide and promote a diversity of recreational angling opportunities for trout statewide.

Strategy 3.1 Develop a systematic plan for monitoring and evaluating angler usage, catch, fish population changes, and management strategy effectiveness on waters providing trout fishing opportunities.

Strategy 3.2 Increase the diversity of angling opportunities for salmonid species within the state.

Opportunity – Investigate if additional opportunities for the stocking of lake trout exist within the state. (Cultured Trout Management)

Opportunity – Investigate opportunities for stocking additional species or hybrids of trout to provide unique fishing opportunities within the state. (Cultured Trout Management)

Opportunity – In addition to the Manasquan River, explore the possibilities of stocking other waters, such as Toms River and the Raritan River, to expand fishing opportunities for sea run brown trout. (Cultured Trout Management)

Strategy 3.3 Continue to maintain and improve angler access to trout fishing waters through land acquisitions and easements, parking lots, boat ramps, and other facilities

Strategy 3.4 Survey anglers on a regular basis (e.g. every five years) to determine angler preferences, attitudes, and satisfaction regarding trout fishing in New Jersey.

Strategy 3.5 Explore opportunities and methods for increasing angler reports to accurately assess the success of recreational fishing opportunities.

Opportunity – Continue to publicize the sea run trout program through articles, updates and news releases. (Cultured Trout Management)

Opportunity – Visibly tag a proportion of sea run brown trout stocked in the Manasquan River to encourage angler reports of catches. (Cultured Trout Management)

Opportunity – Institute a lottery or reward system to encourage reports of catches. (Cultured Trout Management)

GOAL 4 *Maximize the recreational use of trout through the appropriate use of fishing regulations.*

Strategy 4.1 Develop management objectives and evaluation procedures for all regulations, that will allow managers to determine success and effectiveness.

Opportunity – Management goals and measurable objectives need to be established for streams governed by the *General regulation, Fly Fishing Only, Trophy Trout Lakes, Seasonal Trout Conservation, Year Round Trout Conservation Area, and Wild Trout Stream* regulations. This information would assist managers in evaluating regulation success on designated waters and justify future management decisions. (Fishing Regulations)

Opportunity – Management goals and measurable objectives need to be established for lakes governed by the *Holdover Trout Lakes* regulation. Evaluation procedures (the collection of data to evaluate lake suitability, regulation effectiveness, and determination of stocking rates) are needed in order to assist managers in evaluating regulation success on individual waters and justify management decisions. (Fishing Regulations)

Opportunity – Other lakes that support trout year round may be suitable for Holdover Trout Lake regulations. Specific criteria, which would assist managers in selecting additional lakes for inclusion under the *Holdover Trout Lake* regulation, need to be established. (Fishing Regulations)

Opportunity – Management goals, measurable objectives, and evaluation procedures need to be established that would assist managers in evaluating success of the regulation governing water having closed in-season stocking dates. (Fishing Regulations)

Strategy 4.2 Review existing special regulations to determine appropriateness and potential for streamlining and/or designating additional waters.

Opportunity – The desirability and suitability of continuing the *Fly Fishing Only* regulation should be explored. It is possible that another special regulation (*Seasonal* or *Year Round Trout Conservation Area*, or a *Wild Trout Stream*) might be appropriate. Angler preferences and the need to provide fly fishing anglers with adequate spatial segregation from other types of anglers are factors that should also be taken into consideration. (Fishing Regulations)

Opportunity – Other trout maintenance and trout production streams that support trout year round may be suitable for inclusion under the *Year*

Round Trout Conservation Area regulation. In particular the section of the Musconetcong River currently regulated as a *Seasonal Trout Conservation Area* may warrant further consideration. Specific criteria, which would assist managers in selecting additional stream segments for inclusion under the *Year Round Trout Conservation Area* regulation, need to be established.
(Fishing Regulations)

Opportunity – Other trout maintenance and trout production streams that support trout year round may be suitable for inclusion under the *Seasonal Trout Conservation Area* regulation. Specific criteria, which would assist managers in selecting additional stream segments for inclusion under the *Seasonal Trout Conservation Area* regulation, need to be established. (Fishing Regulations)

Opportunity – Specific criteria, which would assist managers in selecting additional trout production streams for inclusion under the *Wild Trout Stream* regulation, need to be established. (Fishing Regulations)

Opportunity – The Blewett Tract (0.5 miles long) is located within the *Fly Fishing Only* stretch of the Big Flatbrook and is currently singled out for gear restrictions year round. The benefit of having this gear exclusion applicable to a half mile section of the brook for the first 9 days of the spring season is questionable. Consideration should be given to modifying the Blewett Tract regulation to be consistent with the *Fly Fishing Only* regulation on the adjacent sections of the Big Flatbrook. (Fishing Regulations)

Opportunity – The Claremont stretch on the S/Br. Raritan River supports a reproducing brook and brown trout population. Existing data should be re-examined to determine if it would be more appropriately regulated as a *Wild Trout Stream*. (Fishing Regulations)

Opportunity – The minimum size and daily creel limit established for *Wild Trout Streams* should be evaluated to determine if the long-term survival of these wild trout populations is being impacted on designated streams. (Fishing Regulations)

Strategy 4.3 Review and modify existing regulations to determine if changes are necessary to further enhance fishing opportunities while providing protection to the resource.

Opportunity – There is speculation that few trout attain the 15-inch minimum harvestable size on designated *Seasonal Trout Conservation Area* and *Year Round Trout Conservation Areas* waters. Data should be collected that would assist managers in evaluating and determining if a lower minimum size would be appropriate. (Fishing Regulations)

Opportunity – The daily creel limit in effect on opening day and six weeks thereafter is currently six per day on waters designated *Seasonal Trout Conservation Area* waters. A reduced creel limit during this period should be considered to improve trout availability during the remainder of the year when special regulations are in effect. (Fishing Regulations)

Opportunity – Some streams that are not trout-stocked or regulated as a *Wild Trout Stream* contain wild trout populations. The harvest of these wild trout is currently governed by the statewide general regulation. The need to have more stringent regulations governing the harvest of wild trout in these trout production streams should be explored. (Wild trout Management)

Opportunity – Other states have special trout regulations that curtail harvest initially and liberalize harvest later in the season to extend the fishery (delayed harvest). The desirability of instituting a similar regulation on select trout streams should be explored. (Fishing Regulations)

Strategy 4.4 Develop a systematic plan for monitoring and evaluating the outcome and effectiveness of regulatory changes.

GOAL 5 Enhance and expand recreational angling opportunities for trout through the use of cultured trout

Strategy 5.1 Continue to utilize cultured trout in waters where wild trout populations are not present or able to sustain a coldwater fishery at desired levels, to create or enhance short and long-term angling opportunities for trout.

Opportunity – The Pequest River stretch consistently harbors large trout (which probably escape from the hatchery but continue to linger because of the hatchery discharge to the Pequest), particularly in the fall. This situation may present a unique opportunity for development of a management strategy that would capitalize on this fishery. (Fishing Regulations)

Opportunity – Several streams (or stream reaches) covered by the "closed in-season stocking dates" regulation experience late spring and summer water temperatures that can negatively affect trout survival. Trout stocked in these waters during the latter part of the spring in-season stocking period (Weeks 6 and 7) may be underutilized if temperature and stress related mortalities occur. (Fishing Regulations)

Strategy 5.2 Optimize the use of available cultured trout, currently at maximum production levels, to maximize benefits to anglers.

Opportunity – The benefits of re-allocating trout from large marginal/non-trout lakes and reservoirs, where angler returns and interest is greatly reduced, to smaller non-trout lakes where angler returns are much higher should be investigated. (Cultured Trout Management)

Opportunity – Identify current trout stocked waters having limited access, thereby offering only limited fishing opportunities and determine if stocking should be discontinued or if access issues can be rectified. (Cultured Trout Management)

Strategy 5.3 Develop management objectives and evaluation procedures for various stocking programs, that will allow managers to determine success and effectiveness.

Opportunity – Management goals and objectives need to be established for put and take and put, grow and take stocking management strategies. (Cultured Trout Management)

Opportunity – Management goals, measurable objectives, and evaluation procedures need to be established for the Sea Run Brown Trout program. (Cultured Trout Management)

Opportunity – Continue to monitor these coastal waters for the presence of sea – run trout populations through angler reports and proven sampling methods. (Cultured Trout Management)

Strategy 5.4 Develop specific criteria for incorporating waters into established stocking programs.

Opportunity – Specific criteria for adding waters to the DFW's trout stocking waters needs to be developed. (Cultured Trout Management)

Strategy 5.5 Evaluate the number and frequency of stockings, particularly on low usage trout-stocked waters, to fine-tune stocking in order to provide more attractive fisheries and increase angler effort.

Opportunity – The frequency of stocking during the spring stocking period should be examined to determine if it provides for the most quality and satisfying angling experience possible. (Cultured Trout Management)

Strategy 5.6 Investigate ways to further enhance current stocking programs to provide more attractive fisheries and increase angler effort without increasing hatchery production needs.

Opportunity – In order to improve angler satisfaction, investigate the feasibility of stocking broodstock into identified lakes each spring to generate increase interest in angling activity of these waters. Specific waters receiving broodstock would change each year. Consider the feasibility of stocking the larger fish during week 2 or 3 of the in-season period to generate renewed interest when typically angler interest in trout begins to decline. (Cultured Trout Management)

Opportunity – Investigate the feasibility of increasing the current allotment of brown trout, at the expense of brook and rainbow stockings on trout maintenance waters currently regulated as Year Round Conservation Areas. (Cultured Trout Management)

Opportunity – Investigate the feasibility of stocking holdover lakes earlier in the pre-season period to promote fishing during the pre-season closure period. Although some illegal harvest may occur, recreational benefits may outweigh original concerns. (Cultured Trout Management)

Opportunity – To improve angler satisfaction, investigate the feasibility of stocking a higher percentage of brown trout, at the expense of brook and rainbow stockings, particularly in the larger trout maintenance waters. (Cultured Trout Management)

Opportunity – Special regulated waters have grown in popularity, increasing angling pressure, investigate the feasibility of increasing the number of in-season stockings on these waters. (Cultured Trout Management)

Strategy 5.7 Utilize current technological advances for the most efficient use of Bureau resources as they relate to fish culture activities.

Opportunity – The database currently used for the management of the state's stocking points and load sheet development, as well as, the program used for determining trout allocations are programmed in dBase III. The program is outdated and certain aspects are no longer operational. The program needs to be re-written into Access or another comparable program. (Cultured Trout Management)

Opportunity – Phone lines currently used to monitor and operate wells are aging and may not be reliable in the future. The purchase of a broad spectrum radio well communication system should be investigated to replace existing communication system. (Culture)

GOAL 6 Educate and communicate with the public to increase awareness of the values and needs of coldwater fishes and promote recreational fishing opportunities.

Strategy 6.1 Increase public awareness of the state's valuable coldwater resources and current threats to these resources through available multimedia resources. Emphasis should be placed on an ecosystem approach and the role of indicator species to assess aquatic ecosystem health.

Opportunity – Develop a program that involves land owners, local communities, and school systems in stewardship activities that promote awareness of the value of our aquatic resources. (Wild Trout Management)

Opportunity – Utilize multiple forms of media such as the Freshwater Fisheries Digest, videos, brochures, summit meetings, and the Internet to educate the public. (Communication)

Opportunity – Increase publications and availability of information on the importance of habitat and indicators of stream health. (Communication)

Strategy 6.2 Develop and implement marketing strategies designed to increase angler participation.

Opportunity – Use data as it becomes available from Point Of Sale technology to target anglers who ceased to purchase a fishing license. Send promotional materials to solicit renewed interest in angling opportunities within the state. (Communication)

Opportunity **–** Investigate ways to further use multi media sources to reach large target audiences to further emphasize the work being carrying out by the DFW and recreational opportunities available across the State. Look to partner with other agencies such as the Division of Parks and Forestry and the NJ Travel and Tourism. (Communication)

Strategy 6.3 Determine ways to use current DFW programs and activities to increase angler participation.

Opportunity – Investigate the feasibility of adding additional free fishing days during the fall of each year. (Communication)

Opportunity – The Open House has become a popular family event and is usually not attended by the more avid anglers. Scheduled for the first weekend in April the weather is usually uncooperative and greatly effects turnout. Investigate moving the event to coordinate with the Free Fishing Days and use the opportunity to solicit future potential anglers. In addition, provide scheduled programs throughout the day on the basics of fishing. (Communication)

Opportunity – Investigate ways to increase angler participation by providing innovative license purchasing opportunities. (Funding)

Opportunity - Investigate a catch and release and a junior component to compliment the current Skillful Angler Awards program. (Communication)

Strategy 6.4 Increase public awareness of the extensive variety of recreational fishing opportunities across the state.

Opportunity – Prepare a pamphlet identifying the extensive trout fishing opportunities that exist within the State. Using GIS maps developed for this plan, prepare maps with location of trout stocked waters, wild trout streams, trout conservation areas, general regulation areas, and special regulation areas. (Communication)

Opportunity – Reconfigure the Bureau's fishing and Bureau page on the DFW's web site to a more topic based approach. Also, reformat the information provided to improve the ease at which information can be acquired. (Communication)

Opportunity – Investigate the feasibility of establishing and maintaining kiosks at high use trout fishing areas (i.e. Round Valley Reservoir, WMA's on major rivers such as the Musconetcong Pequest, Flatbrook, etc.) as a means of educating trout anglers and the general public about trout resource and informing them about DFW activities. (Communication)

Opportunity – Better utilize"*trout stocked water*" signs to depict access for the purposes of fishing. Discontinue stocking in areas where access issues continue to be problematic. (Communication)

Opportunity – Continue to investigate ways to use current equipment and vehicles to promote DFW activities. (Communication)

Strategy 6.5 Continue to develop partnerships with fishing and conservation oriented organizations, and others to increase conservation efforts and promote trout fishing (i.e. through special events, programs, workshops, handicap access, etc.)

Opportunity – Continue with Restoring Our Streams workshop on an annual basis. (Habitat)

Strategy 6.6 Investigate opportunities to partner with manufacturers and stores in producing and distributing informational material pertaining to resource conservation and fishing opportunities in New Jersey.

Strategy 6.7 Increase angler awareness to scientific literature as it relates to specific management decisions and strategies.

Opportunity – Anglers have expressed interest in reviving the barbless hook restriction. Efforts to educate anglers as to the lack of a scientific basis for this restriction is warranted. (Fishing Regulations)

Opportunity – Trout anglers periodically request that additional streams be regulated as fly fishing only based upon their perception that fish mortality will be reduced. Anglers, particularly those who fly fish for trout, should be made aware of hooking mortality studies that demonstrate that mortality differences between lures and flies is insignificant and the basis for the *Fly Fishing Only* regulation is social not biological. (Fishing regulations)

Strategy 6.8 Promote the value of trout fishing in terms of benefits to individual anglers, and to local/regional economy.

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Operational Plan

Overview

The success of any strategic plan is measured by the implementation of identified goals and strategies. A well developed operational component is an integral component to any successful strategic planning document regardless of topic area. The operational segment serves as a work plan for prioritizing goals and strategies, identifying steps for implementation and a time frame of completion. The failure of many strategic documents is that they often lack well developed work plans which identify the steps necessary to achieve desired goals as well as establish reasonable time frames for completion.

Depicted below is the Bureau's proposed work plan for implementing the goals and strategies established within this plan. The work plan provides the framework of Bureau activities, as they relate to the State's coldwater resources, for the next five years. It also identifies long range activities which may be implemented at any time depending on available resources. It should be noted that the activities included within this work plan are in addition to the countless activities which are carried out day to day in the overall management of the state's coldwater resources.

The first phase of implementation of a strategic plan relative to the state's coldwater resources is the adoption of the plan itself. Adoption of the Coldwater Fisheries Management Plan also includes the adoption of several policies outlined within the document. These include the Fish Health Policy, Pequest Hatchery Access Policy and Wild Trout Policy.

Schedule for the Adoption of the Coldwater Fisheries Management Plan:

❖	**Action**	**Schedule**
✓	Complete draft of the Coldwater Management Plan	January 2004
❖	Review by Division Administration	January 2004
❖	Review by Fish Committee	January 2004
❖	Review by Fish and Game Council	February 2004
❖	Release to general public	February 2004
❖	Public comment period	Feb – May 2005
❖	Incorporate comments and finalize plan	May– Dec 2005
❖	Adoption Coldwater Management Plan	January 2006

Action: The Coldwater Plan was released to the public in a draft format to solicit input from the various angler groups, conservation organizations and interested stakeholders prior to being finalized. This allowed the general public to play a major role in the direction of the management of the State's coldwater resources in the future. Due to the enormity of the document the original 3 month public comment period proved insufficient and was extending several times. Closing on April 30, 2005, the public ultimately had one year to comment on the various aspects of the plan.

CY 2004

Opportunity – In order to improve angler satisfaction, investigate the feasibility of stocking broodstock into identified lakes each spring to generate increased interest in angling activity in these waters and trout fishing in general. Specific waters receiving broodstock would change each year. Consider the feasibility of stocking the larger fish during week 2 or 3 of the in-season period to generate renewed interest when typically angler interest in trout begins to decline. (Cultured Trout Management)

Strategy 5.6 Investigate ways to further enhance current stocking programs to provide more attractive fisheries and increase angler effort without increasing hatchery production needs.

Waterbodies Involved: Statewide

Completed

❖	**Action**	**Schedule**
❖	Prepare Recommendations	January 2004
❖	Obtain Council Approval	February 2004
❖	Implementation	April 2004

Action: In 2004 the DFW initiated the Bonus Broodstock Program for the 2004 spring trout season. Nine small impoundments, geographically distributed throughout the state, were selected to receive an additional 35 to 50 large brood stock in addition to the typical 2 % load allocation. The program was well received and has been continued with nine new lakes selected each year.

Opportunity – Special regulated waters have grown in popularity, increasing angling pressure, investigate the feasibility of increasing the number of in-season stockings on these waters. (Cultured Trout Management)

Strategy 5.6 Investigate ways to further enhance current stocking programs to provide more attractive fisheries and increase angler effort without increasing hatchery production needs.

Waterbodies Involved: Pequannock River, Musconetcong River, Raritan River S/Br, Claremont and Ken Lockwood Gorge sections, Pequest River, Paulinskill E/Br, and Toms River.

Completed

❖	**Action**	**Schedule**
❖	Prepare Recommendations	January 2004
❖	Obtain Council Approval	February 2004
❖	Implementation	April 2004

Action: As year round trout conservation areas have grown in popularity among anglers, in 2004 the DFW increased the number of in-season stockings for these special regulated waters from two in-season to three in-season stockings each spring.

Opportunity – Investigate the feasibility of increasing brown trout hatchery production, at the expense of brook and rainbow, for stocking trout maintenance waters currently regulated as Year Round Conservation Areas. (Cultured Trout Management)

Strategy 5.6 Investigate ways to further enhance current stocking programs to provide more attractive fisheries and increase angler effort without increasing hatchery production needs.

Waterbodies Involved: Paulinskill River E/Br, Raritan River S/Br, Claremont and Ken Lockwood Gorge sections, and Toms River

Completed

❖	**Action**	**Schedule**
❖	Prepare Recommendations	January 2004
❖	Obtain Council Approval	February 2004
❖	Alter hatchery species composition	February 2004
❖	Implementation	April 2005

Action: In response to requests from anglers for more brown trout in 2003 the Pequest trout hatchery altered its current culture operations and increased brown trout production by 25,000. Anglers reaped the benefit of these changes in 2005 when the browns were stocked as part of an additional change to increase the number of in-season stockings of trout within designated year round trout conservation areas.

Opportunity – Reconfigure the Bureau's fishing and Bureau page on the DFW's web site to a more topic based approach. Also, reformat the information provided to improve the ease at which information can be acquired. (Communication)

Strategy 6.4 Increase public awareness of the extensive variety of recreational fishing opportunities across the state.

Completed

❖	**Action**	**Schedule**
❖	Prepare new information for web site	January 2004
❖	Provide information to I & E staff	February 2004
❖	Implementation	March 2004

Action: In 2004 the Bureau of Freshwater Fisheries reconfigured the DFW's freshwater fishing page on the DFW's website. The more topic based approach and new format was well received by anglers and will serve as a template for further changes on other pages. Although a good start there is still a considerable amount of work still needed in providing anglers easy access to many of the fishing opportunities which exist throughout the state.

Opportunity – The Open House has become a popular family event and is usually not attended by the more avid anglers. Scheduled for the first weekend in April the weather is usually uncooperative and greatly effects turnout. Investigate moving the event to coordinate with the Free Fishing Days and use the opportunity to solicit future potential anglers. (Communication)

Strategy 6.3 Determine ways to use current DFW programs and activities to increase angler participation.

Completed

❖	**Action**	**Schedule**
✓	Consult with Bureau of I & E staff	Complete

Action: In 2004 the DFW re-scheduled the open house to the third weekend in May in an effort to draw more public attendance. Although the weather was considerably better the competition with other events such as sporting events, graduations etc.. failed to increase public attendance and the event was poorly attended. In 2005, the event was returned to the weekend before the opening day of trout season.

Opportunity – Investigate if there are additional opportunities for the stocking of lake trout within the state. (Cultured Trout Management)

Strategy 3.2 Increase the diversity of angling opportunities for salmonid species within the state.

Waterbodies Involved: Monksville Reservoir

Completed

❖	**Action**	**Schedule**
✓	Lake Inventory Report for Monksville Reservoir	Completed
✓	Council Approval of Recommendations	October 2003
❖	Necessary Fish Code Changes	2004
❖	Initial Stocking of fingerlings	November 2004
❖	Monitor success	2005 – 2008

Action: In November of 2004, lake trout were introduced into Monksville Reservoir. This is the same year that trout stocking was discontinued at Monksville Reservoir. It is too soon to determine if lake trout are better suited for current reservoir conditions and if they will fare better among other top predator species present such as muskellunge and walleyes.

Opportunity – Investigate a catch and release and a junior component to compliment the current Skillfull Angler Awards program. (Communication)

Completed

Strategy 6.4 Increase public awareness of the extensive variety of recreational fishing opportunities across the state.

Action: For the 2004 fishing season the DFW's Skillful Angler Awards Program was modified to include a catch and release category, based on fish length, and a junior category for anglers under the age of 16. The minimum weight for lake trout was increased from 8 pounds to 12 pounds.

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CY 2005

Opportunity – The benefits of re-allocating trout from large marginal/non-trout lakes and reservoirs, where angler returns and interest is greatly reduced, to smaller non-trout lakes where angler returns are much higher should be investigated. (Cultured Trout Management)

Strategy 5.2 Optimize the use of available cultured trout, currently at maximum production levels, to maximize benefits to anglers.

Waterbodies Involved: Spruce Run Reservoir, Lake Hopatcong, Monksville Reservoir, and Manasquan Reservoir

Completed

❖	**Action**	**Schedule**
❖	Complete necessary field/data collection	2004 - 2005
❖	Analyze data	
❖	Prepare Recommendations	
❖	Necessary Fish Code Changes, if required	
❖	Implementation	Spring 2006

Action: Through a formal rule making process trout stocking was discontinued at Monksville Reservoir in 2004. In December of 2004 , the DFW's Bureau of Freshwater Fisheries released for public comment a proposal for significant changes to the DFW's trout program (See Appendix A). This proposal included discontinuing trout stocking on seven large lakes Lake Hopatcong (Sussex/Morris), Spruce Run Reservoir (Hunterdon), Manasquan Reservoir (Monmouth), Pompton Lake (Passaic), Canistear Reservoir (Sussex), Cranberry Lake (Sussex) and Mountain Lake (Warren). These large lakes, over 100 acres, yield lower return rates for trout. In addition, Pompton Lake, Cranberry Lake, and Mountain Lake have limited public access. After a four month public comment period the proposal was amended to continue the stocking of trout in Lake Hopatcong. Trout stocking was discontinued on the remaining six lakes beginning in 2006. All six lakes are stocked with other warmwater fish species by the DFW, and provide excellent fishing opportunities for these other species.

Opportunity – Maintain an inventory of wild trout populations (and their aquatic habitats) in a computerized database so species distributions can be mapped and information readily retrieved. (Goals)

Strategy 2.1 Routinely monitor fish populations, including wild trout, in order to keep management strategies current, aid in the identification of resource problems and issues, and demonstrate agency commitment to the management of aquatic resources.

❖	**Action**	**Schedule**
❖	Creation of database	Completed

❖	QA/QC of data within database	December 2005
❖	Field collection and data manipulation	Ongoing

Action: Preliminary QA/QC of the database has been completed. In January 2006 regional biologists will review drainage information for the final QA/QC of the database to be complete.

<u>Opportunity</u> – Phone lines currently used to monitor and operate wells are aging and may not be reliable in the future. The purchase of a broad spectrum radio well communication system should be investigated to replace existing communication system (Culture)

Strategy 5.7 Utilize current technological advances for the most efficient use of Bureau resources as they relate to fish culture activities

Completed

Action: Listed as a long range item in the draft CWP the DFW received last minute funding from capital monies originally earmarked for other improvements. Several boat ramp improvements projects encountered obstacles preventing their implementation.. Through the Legislature's Joint Budget and Appropriations Committee $ 100,000 of the funds were redirected to the Pequest Hatchery. A new broad spectrum radio communication system was installed in November 2005 to replace the failing well monitoring system.

<u>Opportunity</u> – The database currently used for the management of the state's stocking points and load sheet development, as well as, the program used for determining trout allocations are programmed in dBase III. The program is outdated and certain aspects are no longer operational. The program needs to be re-written into Access or another comparable program. (Cultured Trout Management)

Strategy 5.7 Utilize current technological advances for the most efficient use of Bureau resources as they relate to fish culture activities

Completed

Action – In 2005, the outdated DbaseIII trout stocking program was replaced with a Microsoft Access driven program.

<u>Opportunity</u> – Prepare a pamphlet identifying the extensive trout fishing opportunities that exist within the State. Using GIS maps developed for this plan, prepare maps with location of trout stocked waters, wild trout streams, trout conservation areas, general regulation areas, and special regulation areas. (Communication)

Strategy 6.4 Increase public awareness of the extensive variety of recreational fishing opportunities across the state.

❖	**Action**	**Schedule**
❖	Prepare necessary GIS map overlays	Complete
❖	Design and prepare text for brochure	March 2005
❖	Investigate funding sources for publication	May 2005
❖	Print and Distribute	March 2006

Status – No progress has been made on a trout fishing brochure. Fiscal constraints prevent the design and printing of such a document and in December 2004 the Bureau of Freshwater Fisheries lost its GIS staff person.

CY 2006

Opportunity - Continue to document brook trout distribution in New Jersey, with particular focus on subwatersheds where the brook trout status is currently classified as unknown according to EBTJV classification.

Strategy 1.1 Continue to inventory and classify waters according to their suitability for trout, and provide recommendations for surface water classification changes to the Department of Environmental Protection.

Opportunity - Sample stream segments in 6th level HUC units where self-sustaining populations of brook trout are present, but the extent of their occurrence is uncertain.

Strategy 1.1 Continue to inventory and classify waters according to their suitability for trout, and provide recommendations for surface water classification changes to the Department of Environmental Protection.

Opportunity **–** Better utilize "*trout stocked water*" signs to depict access for the purposes of fishing. Discontinue stocking in areas where access issues continue to be problematic. (Communication)

Strategy 6.4 Increase public awareness of the extensive variety of recreational fishing opportunities across the state.

Waterbodies Involved: Statewide

❖	**Action**	**Schedule**
❖	Consult with Bureau of Law Enforcement	January 2004
❖	If feasible, devise new signs	February 2004
❖	Print and Distribute new signs	March 2004
❖	Address particular access issues which arise	Ongoing

Opportunity – Determine if populations of wild (heritage) brook trout inhabit New Jersey waters and develop strategies to conserve and protect this native fish and its habitat. (Goals)

Strategy 2.2 Develop management strategies to assure the protection of the State's valuable wild coldwater fish populations.

Waterbodies Involved: Mason's Run, Forked Brook, Kurtenbach's Brook, Independence Creek, Halfway House Brook, Cresskill Brook, Havemayer Brook, Crooked Brook, Preakness Brook, Oakdale Creek, Hacklebarney Brook, Kruegers Creek, Rocky Run, Turkey Brook, Trib to S/Br Raritan

(S. of Hoffmans), Mud Pond Outlet Stream, Hibernia Brook, Burnt Meadow Brook, Lake Stockholm Outlet Stream, Van Campens Brook, Cooley Brook, and Flanders Brook.

❖	**Action**	**Schedule**
✓	Collect blood samples	Completed
❖	Prepare & process samples for genetic analyzer	July 2005
❖	Analyze Data	March 2006
❖	Prepare draft report	March 2006
❖	Review by scientific community	

Opportunity – Prioritize and establish a monitoring schedule for wild trout populations. (Wild Trout Management)

Strategy 2.1 Routinely monitor fish populations, including wild trout, in order to keep management strategies current, aid in the identification of resource problems and issues, and demonstrate agency commitment to the management of aquatic resources.

❖	**Action**	**Schedule**
❖	Establish Schedule	November 2006

Opportunity – Determine if the statewide *General Trout Regulation* governing approximately 140 trout production streams (not covered by special regulations) provides a satisfactory level of protection from over-exploitation by anglers. (Goals)

Strategy 4.3 Review and modify existing regulations to determine if changes are necessary to further enhance fishing opportunities while providing protection to the resource.

Opportunity – Determine if current regulations on designated *Seasonal* and *Year Round Trout Conservation Areas* waters provide appropriate protection for these popular recreational areas. (Trout Regulations)

Strategy 4.3 Review and modify existing regulations to determine if changes are necessary to further enhance fishing opportunities while providing protection to the resource.

Waterbodies Involved: Pequannock River, Musconetcong River, Raritan River S/Br, Claremont and Ken Lockwood Gorge sections, Pequest River, Paulinskill E/Br, and Toms River

❖	Action	Schedule
❖	Field Sampling of Conservation Area Waters	Summer 2006
❖	Data Analysis	Winter 2006
❖	Necessary Fish Code Changes, if warranted	2007
❖	Implementation, if feasible	Spring 2008

Opportunity – Management goals, measurable objectives, and evaluation procedures need to be established for the Sea Run Brown Trout program. (Cultured Trout Management)

Strategy 5.3 Develop management objectives and evaluation procedures for various stocking programs, that will allow managers to determine success and effectiveness.

❖	Action	Schedule
❖	Analyze data and angler reports	December 2005
❖	Review of data and current program	February 2006
❖	Development of objectives and evaluation	December 2006

CY 2007

Opportunity – The Claremont stretch on the S/Br. Raritan River supports a reproducing brook and brown trout population. Existing data should be re-examined to determine if it would be more appropriately regulated as a *Wild Trout Stream*. (Fish Regulations)

Strategy 4.2 Review existing special regulations to determine appropriateness and potential for streamlining and/or designating additional waters.

Opportunity – Identify current trout stocked waters having limited access, thereby offering only limited fishing opportunities and determine if stocking should be discontinued or if access issues can be rectified. (Cultured Trout Management)

Strategy 5.2 Optimize the use of available cultured trout, currently at maximum production levels, to maximize benefits to anglers.

Waterbodies Involved: Shadow Lake, Blue Mountain, Blair Lake, Stony Lake

❖	**Action**	**Schedule**
❖	Complete necessary field/data collection	2007
❖	Analyze data	
❖	Prepare Recommendations	
❖	Necessary Fish Code Changes, if required	
❖	Implementation	

Opportunity – Specific criteria for adding waters to the DFW's trout stocking waters needs to be developed. (Cultured Trout Management)

Strategy 5.4 Develop criteria for incorporating waters into established stocking programs.

Waterbodies Involved: Statewide

❖	**Action**	**Schedule**
❖	Establish Criteria	February 2007

CY 2008

Opportunity – Conduct an angler preference survey.

Strategy 3.4 Survey anglers on a regular basis (e.g. every five years) to determine angler preferences, attitudes, and satisfaction regarding trout fishing in New Jersey.

Opportunity – Management goals and measurable objectives need to be established for lakes governed by the *Holdover Trout Lakes* regulation. Evaluation procedures (the collection of data to evaluate lake suitability, regulation effectiveness, and determination of stocking rates) are needed in order to assist managers in evaluating regulation success on individual waters and justify management decisions. (Fish Regulations)

Strategy 4.1 Develop management objectives and evaluation procedures for all regulations, that will allow managers to determine success and effectiveness.

Opportunity – Other lakes that support trout year round may be suitable for Holdover Trout Lake regulations. Eligibility criteria, which would assist managers in selecting additional lakes for inclusion under the *Holdover Trout Lakes* regulation, needs to be established. (Fish Regulations)

Strategy 4.2 Review existing special regulations to determine appropriateness and potential for streamlining and/or designating additional waters.

Opportunity – Through review of scientific literature and field sampling the impacts of stocking cultured trout in trout production streams should be investigated to determine if alternative stocking practices are warranted. (Cultured Trout Management)

Strategy 2.3 Evaluate current management practices which may negatively impact wild trout populations.

CY 2009

Opportunity – Management goals and measurable objectives need to be established for streams governed by the *Fly Fishing Only, Seasonal Trout Conservation, and Year Round Trout Conservation Area,* regulations. This information would assist managers in evaluating regulation success on designated waters and justify future management decisions. (Fish Regulations)

Strategy 4.1 Develop management objectives and evaluation procedures for all regulations, that will allow managers to determine success and effectiveness.

Opportunity – Several streams (or stream reaches) covered by the "closed in-season stocking dates" regulation experience late spring and summer water temperatures that can negatively affect trout survival. Trout stocked in these waters during the latter part of the spring in-season stocking period (Weeks 6 and 7) may be underutilized if temperature and stress related mortalities occur. (Fish Regulations)

Strategy 5.1 Continue to utilize cultured trout in waters where wild trout populations are not present or able to sustain a coldwater fishery at desired levels, to create or enhance short and long-term angling opportunities for trout.

Long Range

Opportunity – Determine if there are linkages between wild trout populations and topographic characteristics (gradient and elevation), soils, land-use, physicochemical characteristics, and other features to develop a tool for identifying potential or historical wild trout habitat. (Wild Trout Management)

Strategy 1.2 Identify and protect important coldwater fish habitat and ecosystems.

Opportunity – Identify habitats and ecosystem types that support wild trout and are in danger of being lost or drastically altered. Explore ways to protect landscapes in which wild trout occur through links with management initiatives for other biotic resources (plants, birds, herptiles, etc.). (Wild Trout Management)

Strategy 2.1 Routinely monitor fish populations, including wild trout, in order to keep management strategies current, aid in the identification of resource problems and issues, and demonstrate agency commitment to the management of aquatic resources.

Opportunity – Investigate opportunities for stocking additional species or hybrids of trout to provide unique fishing opportunities within the state. (Cultured Trout Management)

Strategy 3.2 Increase the diversity of angling opportunities for salmonid species within the state.

Opportunity – Management goals and measurable objectives need to be established for streams governed by the *General regulation, Trophy Trout Lakes, and Wild Trout Stream* regulations. This information would assist managers in evaluating regulation success on designated waters and justify future management decisions. (Fish Regulations)

Strategy 4.1 Develop management objectives and evaluation procedures for all regulations, that will allow managers to determine success and effectiveness.

Opportunity – Investigate the feasibility of using Natural Resources Damages funds to fund a staff position dedicated to the restoration and enhancement of coldwater fish habitat. (Habitat Management)

Strategy 1.4 Develop and implement a habitat improvement and restoration program.

<u>Opportunity</u> – The Pequest River stretch consistently harbors large trout (which probably escape from the hatchery but continue to linger because of the hatchery discharge to the Pequest), particularly in the fall. This situation may present a unique opportunity for development of a management strategy that would capitalize on this fishery. (Fish Regulations)

Strategy 5.1 Continue to utilize cultured trout in waters where wild trout populations are not present or able to sustain a coldwater fishery at desired levels, to create or enhance short and long-term angling opportunities for trout.

<u>Opportunity</u> – The desirability and suitability of continuing the *Fly Fishing Only* regulation should be explored. It is possible that another special regulation (*Seasonal* or *Year Round Trout Conservation Area*, or a *Wild Trout Stream*) might be appropriate. Angler preferences and the need to provide fly fishing anglers with adequate spatial segregation from other types of anglers are factors that should also be taken into consideration. (Fish Regulations)

Strategy 4.2 Review existing special regulations to determine appropriateness and potential for streamlining and/or designating additional waters.

<u>Opportunity</u> – The Blewett Tract (0.5 miles long) is located within the *Fly Fishing Only* stretch of the Big Flatbrook and is currently singled out for gear restrictions year round. The benefit of having this gear exclusion applicable to a half mile section of the brook for the first 9 days of the spring season is questionable. Consideration should be given to modifying the Blewett Tract regulation to be consistent with the *Fly Fishing Only* regulation on the adjacent sections of the Big Flatbrook. (Fish Regulations)

Strategy 4.2 Review existing special regulations to determine appropriateness and potential for streamlining and/or designating additional waters

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Glossary

anadromous Characterizes the life cycle of a fish that spawns in freshwater and spends a significant portion of its adult life in the ocean. Examples are salmon and steelhead trout.

angler A person who fishes with hook and line as a hobby or sport.

angler-hour One hour of fishing by a single angler.

angler trip A visit by an angler to a fishing site or area. Depending on the purposes of the data, an angler trip can be defined as hours of fishing at the site in one day, a 24-h day, the number of days in the vicinity of the site, or the number of days away from home.

artificial lures refers to the man-made, non-natural objects used to attract game fish and entice them into biting.

biodiversity Biological diversity. The natural variety of plants and animals that includes 1) genetic diversity, 2) species diversity, 3) ecosystem diversity, and 4) landscape diversity. Optimum biodiversity is that which occurs naturally in an undisturbed system. The key words are "natural and undisturbed." It concerns biological integrity within a system and not necessarily a large variety of species. Managers should be concerned with the loss of natural biodiversity rather than absolute numbers of species.

Boundary Water A stream separating New Jersey from an adjoining neighboring state (Delaware River) or a lake shared by New Jersey and an adjoining state (Greenwood Lake). Separate fishing regulations apply to these waters for consistency and to avoid angler confusion.

catchable (catchable-sized) trout Refers primarily to hatchery-produced trout that are stocked at a specific size (or size range) that is considered attractive by anglers for immediate harvest. Spring-stocked catchable trout average 10.5 inches and weigh ½ pound. Fall and winter-stocked catchable trout average 9 inches. In New Jersey catchable trout are used in both put-and-take and put-and-grow managed fisheries.

catch-and-release A management strategy and a method of angling which refers to the immediate release of captured fish back into the water.

catch rate The number or weight of organisms caught per unit of time.

Category One (C1) C1 waters are designated in the NJ Surface Water Quality Standards for the purposes of implementing antidegradation policies, for protection from measurable changes in water quality characteristics because of their clarity, color, scenic setting, exceptional recreational or water supply significance, or exceptional fisheries resources. Waters classified as FW2-Trout Production waters (FW2-TP) and their tributaries, and FW2 trout maintenance and non-trout waters upstream of FW2-TP waters, may be designated C1.

coldwater fishes A broad term applied to fish species that inhabit waters with relatively temperatures (optimum temperatures generally between 4-15°C (40-60°F). Examples are salmon, trout, chars, and whitefish.

coolwater fishes A broad term applied to fish species that inhabit waters with relatively cool temperatures (optimum temperatures generally between 10 and 21°C (50 and 70°F).

creel Traditionally, the woven basket used to store harvested fish. Now, the fish harvested by an angler.

creel survey An on-site survey designed to estimate fishing effort and fish harvest from a sample of anglers.

cultured trout Trout reared in a hatchery setting.

domesticated trout Strains of hatchery-produced trout that have been reproduced and reared in the hatchery environment for several generations. These strains generally exhibit qualities that are suitable within the fish culture environment, and can withstand the rigors of handling and stocking.

electrofishing The use of electricity to capture fish.

eutrophic Having high concentrations of phosphorus, nitrogen, or other nutrients that result in high algal productivity. Water bodies can be naturally eutrophic. Nutrient increase caused by human activities is called eutrophication.

exotic species A non-native species introduced from a foreign country..

extirpated A native species no longer present, either as a result of natural causes or because of eradication by humans.

fingerling A trout approximately 2 ½ to 4 inches in length and weighing 16 per pound or smaller. This size category is stocked by truck in put-and-grow trout fisheries where trout growth potential is high.

Fish and Game Council An 11 member board empowered with the legal responsibility to adopt NJ's Fish and Game Codes and appoint a Director for the NJ Division of Fish and Wildlife (subject to the Governor's approval).

Fish Code Defines the legal angling methods, season dates, size and catch limits, and trout stocking locations for freshwater fishing in the Garden State. The regulations are annually reviewed, revised, and promulgated through a set legal process.

fishing pressure The amount of fishing taking place over a specified period of time in an area or at a particular site. In recreational fisheries, where fishing pressure is also called fishing effort, pressure usually is measured in angler-hours or angler-trips.

fishing success Normally the number of fish caught per unit of time (catch per unit effort) or harvested per unit time (harvest per unit effort) by an angler or group of anglers.

freestone stream A relatively unfertile stream associated with sandstone, shale, and other non-carbonate rocks. Although the upper reaches may be spring-fed, it is generally fed from runoff and small feeder-type streams and gains water a little at a time. These streams tend to flow off ridges and are fed from a single watershed. The fast moving, unfertile water inhibits the growth of weeds or other rooted vegetation resulting in a "free stone" bottom. Some freestone streams may dry up in the summer or experience greatly reduced flows. Most of the cold water streams in New Jersey are freestone streams.

FW1 Those fresh waters, as designated in New Jersey's Surface Water Quality Standards N.J.A.C. 7:9B-1.15(h) Table 6, that are to be maintained in their natural state of quality (set aside for posterity) and not subjected to any man-made wastewater discharges or increases in runoff from anthropogenic activities. These waters are set aside for posterity because of their clarity, color, scenic setting, other characteristic of aesthetic value, unique ecological significance, exceptional recreational significance, exceptional water supply significance, or exceptional fisheries resources(s).

FW2 The general surface water classification applied to those fresh waters that are not designated as FW1 or Pinelands Waters.

groundwater (1) Water located interstitially in the substrate of the earth that is recharged by infiltration and enters streams through seepage and springs. (2) Subsurface water in a zone of saturation, standing in or passing through (groundwater flow) the soil and the underlying strata.

habitat The physical, chemical, and biological features of the environment where an organism lives.

harvest Fish permanently removed from the water by recreational or commercial fishers.

hatchery trout Any wild or native trout hatched and reared in a hatchery environment. This term generally refers to domesticated strains of trout that are reared to a catchable size and used in put-and-take or put-grow-and-take fisheries.

hatchery trout Any wild or native trout hatched and reared in a hatchery environment. However, anglers often use this term exclusively for domesticated strains of trout reared to a

heritage brook trout Descendants from ancestral brook trout (fish that colonized an area after deglaciation), that exist in discrete populations having gene pools that are different from hatchery or hybridized populations by virtue of distinct alleles and allele frequencies selected for by the environmental conditions in which these populations evolved.

holdover trout A trout (typically hatchery-reared and stocked) which has survived through the summer period when water temperatures are at their highest and can negatively impact trout survival.

Holdover Trout Lake A special fishing regulation in New Jersey that is designed to provide for a fishery for quality-sized trout in impoundments capable of supporting trout year round.

hypolimnion Poorly oxygenated and illuminated lower layer or region in a stratified lake that extends from the metalimnion to the bottom and is essentially removed from major surface influences. Water in the hypolimnion is denser and colder than strata higher in the water column.

in-season The seven week trout stocking period immediately following New Jersey's opening day of the trout season in April.

intermittent stream **A s**tream without a continuous flow year round.

limestone stream A stream located in a valley area that flows through a bedrock of limestone or through an area interspersed with limestone deposits. It is characterized by alkalinities of 75 – 150 mg/L or greater, a stable pH of 7.5 – 8.0 year round, low gradient, high abundance of aquatic plants and invertebrate life, and nearly constant ambient water temperatures throughout the year. Few coldwater streams in New Jersey are limestone streams.

macroinvertebrate An invertebrate animal (without backbone) large enough to be seen without magnification and retained by a 0.595 mm (U.S. #30) screen.

minimum length A numerical value (typically in inches) establishing the smallest size at which a fish species may be legally harvested or creeled. The minimum size for a given species may vary between waterbodies, depending upon fisheries management strategies.

mortality The rate of death, expressed as percentage loss, as loss per unit of time, (per day, per year), or as both (e.g., percent loss per day). In fisheries contexts, total mortality is often divided into fishing mortality (mortality caused by human exploitation) and natural mortality (mortality caused by all other factors).

native In the U.S., a species historically occurring in a geographic range previous to the arrival of the first European settlers. The brook trout is the only salmonid species native to New Jersey.

New Jersey Department of Environmental Protection (DEP)

New Jersey Division of Fish and Wildlife (DFW)

non-native A species found outside of their historical range. The occurrence of a non-native species may be a result of intentional stocking (sport fish or biological control), unintentional stocking (escape), or a response to habitat/climatic changes. Brown trout, rainbow trout, and lake trout are examples of non-native salmonid species that occur in New Jersey.

nontrout waters Fresh waters that have not been designated in New Jersey's Surface Water Quality Standards N.J.A.C. 7:9B-1.15(b) through (h) as trout production or trout maintenance. These waters are generally not suitable for trout because of their physical, chemical, or biological characteristics, but are suitable for a wide variety of other fish species.

opening day of trout season In New Jersey, the first or second Saturday in April day when all trout stocked waters are open to public angling and trout may be harvested.

perennial stream A stream that has continual flow year round, even during period of no rainfall

plankton Small plants and animals, generally smaller than 2 mm and without strong locomotive ability, that are suspended in the water column and carried by currents or waves that may make daily or seasonal movements in the water column.

population All individuals of the same species within a defined geographic location at a given time.

pre-season The three week period immediately proceeding New Jersey's opening day of trout season in April. The majority of trout-stocked waters are closed to angling during this period.

put-and-take A management technique involving the stocking of cultured, catchable fish in waters where angling demand is high, and where habitat conditions are not suitable to support a satisfactory year round fishery.

put-and-grow A management technique involving the stocking of cultured fish (catchable or sub-catchable) in waters where habitat conditions support growth and survival of juveniles and adults year round, but where reproduction capability is limited or absent.

recreational fishery A fishery in which fish are caught for pleasure, not for sale.

redd Nest excavated in the substrate by fish for spawning where fertilized eggs are deposited and develop until the eggs hatch and larvae emerge from the substrate.

riparian Area adjacent to a stream channel including stream banks.

salmonids Fishes that are members of the taxonomic family *Salmonidae*, that occur in cold-water streams and lakes of North America and Eurasia. Examples include trout, salmon, and chars.

Sport Fish Restoration Act A cost sharing program with matching federal funds supplied through the Dingell-Johnson Federal Aid in Sport Fish Restoration Act (P.L. 81-681), and subsequent amendments (Wallop-Breaux), and administered by the U.S. Fish and Wildlife Service.

stakeholders Individuals (or groups) who are affected by, or perceive they are affected by, a fishery resource and its management.

standing crop The total weight of a fish species, or fish community, per unit area at a given time.

stormwater rainwater which flows overland into waterways or is absorbed by the ground and plants

Surface Water Quality Standards (SWQS) Establishes the designated uses to be achieved and specifies the water quality (criteria) necessary to protect New Jersey's surface waters. The SWQS also contain technical and general policies to ensure that the designated uses are adequately protected.

sub-catchable Refers primarily to hatchery-produced trout that are stocked at a size that is generally not considered attractive to anglers for immediate harvest (generally less than seven inches).

sub-legal Refers to a size of fish that can not be legally harvested.

tailwater Flowing water below a dam that is released from an upstream impoundment. Often releases from the hypolimnion in the reservoir provides clear, cold water in the tailwater that can support coldwater sport fisheries.

thermocline Stratum between the epilimnion and hypolimnion that exhibits a marked temperature gradient equal to or exceeding 1°C per meter. Synonymous with mesolimnion or metalimnion.

total length The maximum length of a fish, as measured from the most anterior part of the fish (snout) to the longest caudal fin ray (tail) when the lobes of the caudal fin are compressed.

Trophy Trout Lake A special fishing regulation in New Jersey that is designed to provide for a fishery for quality-sized trout in impoundments capable of supporting trout year round.

Trout Conservation Area In New Jersey, a designated stream section having special fishing regulations that are designed to promote catch-and-release fishing year round or seasonally.

TM See *trout maintenance waters.*

trout maintenance waters Waters designated by New Jersey's Surface Water Quality Standards N.J.A.C. 7:9B-1.15(b) through (g) for the support of trout throughout the year.

TP See *trout production waters.*

trout production waters Waters designated by New Jersey's Surface Water Quality Standards N.J.A.C. 7:9B-1.15(b) through (g) for use by trout spawning or nursery purposes during their first summer.

trout stamp Required in conjunction with a valid New Jersey fishing license for any person between the ages of 16 and 69 who shall take, attempt to take, or kill trout.

trout water This generally refers to anywhere that trout are managed, but is also specifically defined in regulation code as to bodies of water where a trout stamp is required for fishing.

two-story lake Lake with an upper layer of warm water supporting warmwater fishes and a lower (i.e., deeper) layer of cold water supporting coldwater fishes.

USFWS United States Fish and Wildlife Service.

voucher specimens Specimens archived in permanent collections to serve as physical evidence that documents the existence and physical presence of species.

warmwater fishes A broad term applied to fish species that inhabit waters with relatively warm water temperatures (optimum temperatures generally between 15-27°C (60-70°F).

watershed A region or area drained by surface and groundwater flow in rivers, streams, or other surface channels. A smaller watershed can be wholly contained within a larger watershed.

wild trout Includes any trout (native or non-native) that is a product of parents that spawned naturally and has spent its entire life in a natural stream or lake environment. Wild trout may include the offspring of hatchery trout that reproduced in a natural environment.

Wild Trout Stream In New Jersey, a designated stream or stream section having special fishing regulations that are designed to conserve the wild trout population inhabiting the stream.

year-class strength Fisheries term referring to a measure or index of how many individual fish are born in a given year, relative to other years.

young-of-the-year Fish in their first year of life.

zooplankton Planktonic animals that are composed primarily of protozoans and small crustaceans.

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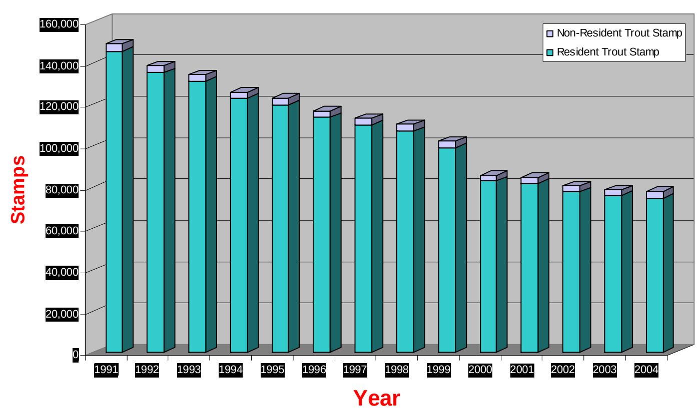
APPENDIX A

New Jersey Division of Fish and Wildlife

Potential Changes to the Trout Stocking Program for 2005 and 2006

At the December 4th Fisheries Forum, our biologists outlined the disturbing trend that the Division has been facing in New Jersey for some time: the continued decline of fishing licenses and trout stamps for the past ten years. Unfortunately this is a national trend that has state fish and wildlife Directors in other parts of the country quite concerned as well. In 2004 we saw a slight increase in the number of fishing licenses sold but unfortunately trout stamp sales continued to decline. The failure of the current trout program to draw in new anglers or at least maintain current interest in the program is obvious. These trends and the resulting declining revenue base has forced the Division to look at all aspects of its current programs and to propose changes in an effort to increase angler participation.



The overall emphasis of the proposed changes to the trout stocking program is threefold:

1) provide more fish earlier in the trout stocking season, while angler interest is still high;
2) increase the availability of fish in areas where anglers consistently get higher returns and;
3) add new waters to the program, to attract new anglers.

This information was first presented at the 2004 Fisheries Forum, held December 4, to give anglers and interested parties an early opportunity to provide input regarding potential changes. Angler input has always played a critical role in the development of our successful freshwater fisheries programs. There are five potential changes to the Division’s trout program that are explained in detail below. Only one change, stocking ponds and lakes earlier in the in-season period, is proposed for 2005. The remaining potential changes are proposed for 2006. The removal of a waterbody from the trout stocking program (potential changes # 2 & # 3) can only be made through the regulatory process that the New Jersey Fish and Game Council undertakes to adopt the annual Fish Code. This process includes a formal sixty-day public comment period and a public hearing which will be scheduled sometime in September. This information will also be presented at the Division’s upcoming Trout Meeting on February 12, 2005 at 10am at the Pequest Trout hatchery. Anglers are urged to attend to provide comments on all aspects of the proposal. Comments made via e-mail can be directed to Lisa.Barno@dep.state.nj.us.

POTENTIAL CHANGE # 1 – Proposed Spring 2005

Stock 70 ponds and lakes with seasonal trout fisheries earlier during the in-season stocking period following opening day.

	Pre-Season	In-Season						
		Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7
EXISTING (2004)	Stocked	Not Stocked	Stocked	Stocked	Stocked	Some Stocked	Not Stocked	Not Stocked
PROPOSED (2005)	Stocked	Stocked	Stocked	Stocked	Some Stocked	Not Stocked	Not Stocked	Not Stocked
	32,000	24,000	24,000	24,000	6,000			

PRO's

- Provide more opportunities to fish for freshly stocked trout during the week following opening day.
- Provides more fish earlier in the season while angler interest is still high.
- Increase angler utilization of trout before trout succumb to effects of warmwater.
- Eliminate or reduce immediate loss of trout due to warm waters.
- Reduce crowding/improve fish health in hatchery by shipping trout earlier.
- Increase staff availability later in the spring for other activities.

CON"S

- Anglers are accustomed to the traditional in-season stocking patterns and may be disappointed if they are not aware of the change.

POTENTIAL CHANGE # 2 – Proposed Spring 2006 (Fish Code Item)

Discontinue stocking trout in seven large lakes greater than 100 acres

Waterbodies	Acres	# Trout
Mountain Lake	122	1430
Cranberry Lake	179	1170
Pompton Lake	204	1420
Canistear Reservoir	350	2460
Manasquan Reservoir	770	3720
Spruce Run Reservoir	1290	5250
Lake Hopatcong	2685	10440
	TOTAL	**25,890**

- Higher return on trout stocked in ponds/small lakes vs large lakes

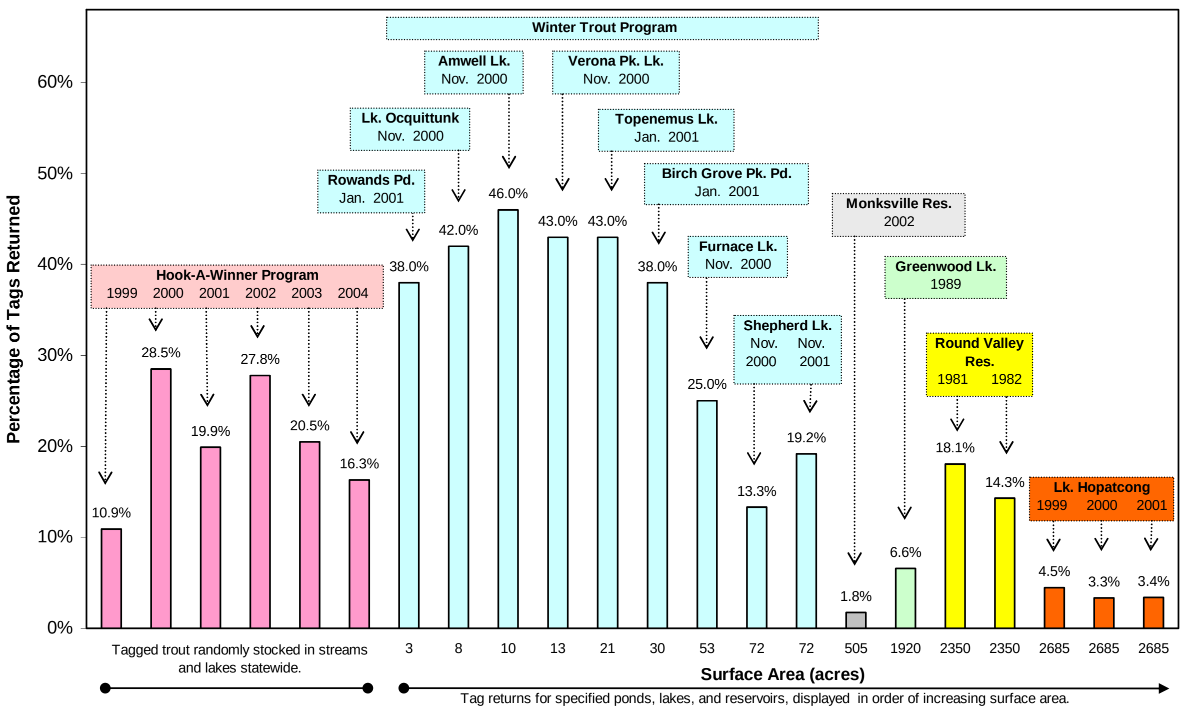


Figure 6. A comparision of tag returns from trout tagging studies conducted during a 21 year period (1981 - 2001) in New Jersey streams, ponds, lakes, and reservoirs. Metal jaw tags were afixed to catchable-sized trout (9-12 inches)

* Monksville Reservoir, Greenwood Lake, Shephards Lake (Winter Trout)have already been dropped from specific Division stocking programs.

- Trout angler participation on opening day higher on ponds, small lakes, and streams vs large lakes
- These lakes are regularly stocked by the Division with other species & have good warmwater fisheries
- There are many other trout fishing opportunities nearby (10 to 20 in a ten mile radius)
- Many of these lakes have angler access issues
- Trout do not survive through the summer months or summer survival is very spotty (none regulated as Trophy or Holdover Trout Lakes)

The 25,860 trout from these seven large waterbodies would be re-allocated to:

a. increase the pre-season stocking on 16 major trout maintenance streams by 25 %

Streams	Pre-season	+ 25 %	Increase
Big Flat Brook - Lower	8,490	9550	1060
Black River	1590	1990	400
Manasquan River	3170	3960	790
Metedeconk River N/B	1330	1660	330
Metedeconk River S/B	1180	1480	300
Musconetcong River - Upper	2850	3560	710
Musconetcong River - Lower	10370	12960	2590
Paulins Kill – Upper	1330	1660	330
Paulins Kill – Middle	760	950	190
Paulins Kill - Lower	6370	7960	1590
Pequest River – Upper	630	790	160
Pequest River – Middle	1680	2100	420
Pequest River – Lower	5470	6840	1370
Pohatcong Creek – Lower	3110	3890	780
Ramapo River	4600	5750	1150
Raritan River N/B	4510	5640	1130
Raritan River S/B – Lower	2840	3550	710
Raritan River S/B – Middle	7270	9090	1820
Rockaway River – Upper	2020	2530	510
Rockaway River – Lower	4290	5360	1070
Toms River	1740	2180	440
Wallkill River – Lower	1010	1260	250
Wanaque River - Upper	1060	1330	270
Wallkill River – Upper	1060	1330	270

18,500 MORE TROUT FOR OPENING DAY WHEN ANGLER INTEREST AND PARTICIPATION IS HIGH

b. Add new waters to the trout stocking program in order to increase participation

Daretown Lake
Hunterdon County Park Lake
Echo Lake
East Brunswick Park Lake
Heddon Park Lake
Hopkins Pond
Lake Fred
Wampum Lake

Note: The waters listed above have been recommended as additions to the current program. However, this list has not been finalized. The Division is seeking input from anglers as to waterways/areas which may provide additional trout fishing opportunities.

AND/OR

c. add in-season stockings to some or all of the lakes currently only receiving trout during the pre-season period.

Clarks Pond
Haddon Lake
Lake Papaianni
Mac's Pond
Scarlet Oak Pond
Silver Lake
Spooky Bk. Park Pond
Warinanco Park Pond
West Hudson Co. Park Pond
Westville Pond

Note: The Division is seeking input from anglers on which waterways listed above may benefit anglers through the addition of in-season stockings.

PRO's

- Trout are relocated to other waters where trout angling activity and return rates are higher or expected to be higher.

- Additional trout are provided for opening day when angler interest and participation is high.

- The addition of new waters to the stocking program will increase the number of fishing opportunities and potentially increase license sales.

- Trout relocated to those streams where trout can survive in the summer could extend fishing beyond the spring.

- Many established trout fishing opportunities nearby.

CON's

- Anglers accustomed to fishing for trout in these lakes would have to fish other waters for trout.

- Anglers that currently fish for trout in waters that are dropped from the stocking program may stop fishing for trout altogether.

POTENTIAL CHANGE # 3 – Proposed Spring 2006 (Fish Code Item)

Discontinue stocking on six small streams having reproducing brook trout populations.

Stream	Miles Stocked	# Trout
Barkers Mill Brook	1.0	260
Biers Kill	1.2	480
Roaring Rock Brook	2.2	1020
Roy Spring Brook	1.2	320
Shimers Brook	1.0	320
Tuttle's Corner Brook	1.0	750
	TOTAL	**3,150**

The 3,150 trout from these six waters would be re-allocated to:

a. Add new waters to the trout stocking program in order to increase participation

Daretown Lake
Hunterdon County Park Lake
Echo Lake
East Brunswick Park Lake
Heddon Park Lake
Hopkins Pond
Lake Fred
Wampum Lake

Note: The waters listed above have been recommended as additions to the current program. However, this list has not been finalized. The Division is seeking input from anglers as to waterways/areas which may provide additional trout fishing opportunties.

AND/OR

b. add in-season stockings to some or all of the lakes currently only receiving trout during the pre-season period.

Clarks Pond
Haddon Lake
Lake Papaianni
Mac's Pond
Scarlet Oak Pond
Silver Lake

Spooky Bk. Park Pond
Warinanco Park Pond
West Hudson Co. Park Pond
Westville Pond

Note: The Division is seeking input from anglers on which waterways listed above may benefit anglers through the addition of in-season stockings.

PRO's

- Eliminate negative impacts of larger cultured trout on small native brook trout.
- Small streams can not accommodate large numbers of anglers attracted by stocked trout
- These streams will still provide anglers with trout fishing opportunities.
- The harvest of wild trout may be reduced.

CON's

- Anglers accustomed to fishing for trout in these areas will have to fish other waters for stocked trout.
- Anglers currently fishing in streams that are dropped from the program may stop fishing for trout altogether.

POTENTIAL CHANGE # 4 – Proposed for Fall 2006

Produce larger, but fewer trout for the fall program.

	# Stocked	Size	Age	Species	Stocking Season
Current	50,000	9”	1 year	Rainbows	3 weeks
Proposed	20,000	12-16”	2 years	Brk, Brn, Rnbws	2 weeks *

- Stocking season would be reduced to two weeks, since in order to raise the fish to a larger size the surplus trout which are currently distributed week 3 would have to be stocked at the end of August early September.
- Spring baseline would have to be reduced from 575,000 to 570,000. However, the reduction of 5,000 trout over a ten week stocking period over 200 waterbodies is anticipated to have a negligible impact to anglers.

PRO’s

- Stocking larger trout provides a more attractive fishery for existing anglers.
- The opportunity to fish for larger trout may attract new trout anglers.
- Trout not harvested in the fall/winter will be available to anglers on opening day.
- Surplus trout stocked earlier can provide additional angling opportunities.

CON’s

- Less trout will be available for anglers to catch.
- Anglers preferring to fish for more smaller trout rather than fewer larger trout may chose not to fish for trout.

POTENTIAL CHANGE # 5 – Proposed for Winter 2006

Produce larger, but fewer trout for the fall program.

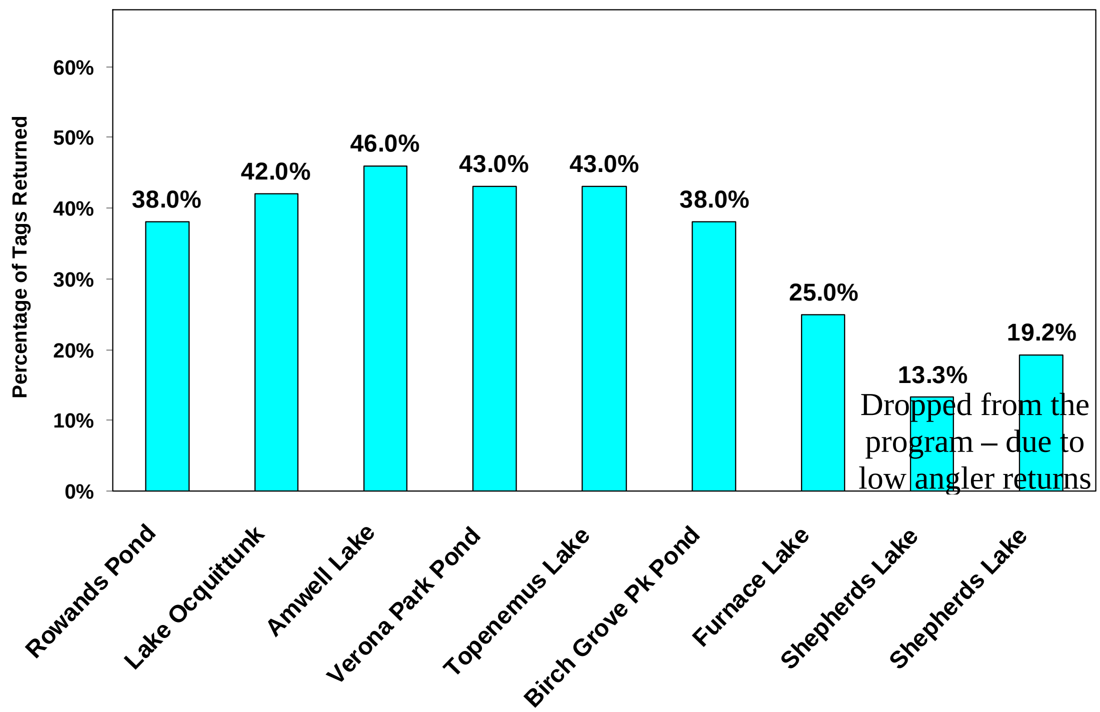
	# Stocked	Size	Age	Species	Stocking Season
Current	10,000	9"	1 year	Rainbows	3 days
Proposed	5,000	12-16"	2 years	Rainbows	3 days

PRO's

- Stocking larger trout provides a more attractive fishery for existing anglers.
- The opportunity to fish for larger trout may attract new trout anglers.
- Trout not harvested in the fall/winter will be available to anglers on opening day.
- Surplus trout stocked earlier can provide additional angling opportunities.

CON's

- Less trout will be available for anglers to catch.
- Anglers preferring to fish for more smaller trout rather than fewer larger trout may chose not to fish for trout.
- The Winter Trout Program already provides excellent returns



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APPENDIX B

New Jersey Division of Fish & Wildlife
List of New Jersey Freshwater Fishes
(Revised 2005)

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 oxyrhynchus	Atlantic sturgeon	BI	IS	N
Acipenser brevirostrum	shortnose 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
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 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
Esocidae:				
Esox americanus	redfin pickerel	P	MT	N
Esox lucius	northern pike	P	IS	NN
Esox niger	chain pickerel	P	MT	N
Esox masquinongy	muskellunge	P	IS	NN

Scientific Name	Common Name	Trophic Guild	Tolerance	Historical Presence
Cyprinidae:				
Carassius auratus	goldfish	G	TS	E
Cyprinus carpio	common carp	G	TS	E
Carpiodes cyprinus	quillback	BI	TS	N
Exoglossum maxillingua	cutlips 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
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 promelas	fathead minnow	G	TS	NN
Pimephales notatus	bluntnose 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	US
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
Aphredoderidae:				
Aphredoderus sayanus	pirate perch	I	MT	N
Cyprinodontidae:				
Fundulus diaphanus	banded killifish	I	TS	N
Fundulus heteroclitus	mummichog	I	TS	N
Poeciliidae:				
Gambusia holbrooki	eastern mosquitofish	I	TS	N
Gambusia affinis	mosquitofish	I	TS	NN

Scientific Name	Common Name	Trophic Guild	Tolerance	Historical Presence
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 cyanellus	green sunfish	I/P	TS	NN
Lepomis gibbosus	pumpkinseed	I	MT	N
Lepomis macrochirus	bluegill	I	TS	NN
Lepomis auritus	redbreasted sunfish	I	MT	N
Lepomis gulosus	warmouth	I/P	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	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.

APPENDIX C

New Jersey Division of Fish and Wildlife

Classification of New Jersey Waters as Related to Their Suitability for Trout[1]

General Explanation

This classification was developed by the Bureau of Freshwater Fisheries under Project F-20-R, which was supported in part by Dingell-Johnson Federal-Aid-to-Fisheries funds administered by the U.S. Fish and Wildlife Service (USFWS). This report is periodically revised by the Bureau under Project F-48-R, "Investigations and Management of New Jersey's Freshwater Fisheries Resources", which is supported in part by Wallup-Breaux funds administered by the USFWS. Users should check with the Bureau to ensure that they have the most up-to-date version.

The official surface water classifications for the waters of the State are contained in the Surface Water Quality Standards (SWQS) adopted by the Department of Environmental Protection (N.J.A.C. 7:9B-1). A copy of this document may be obtained online at http://www.state.nj.us/dep/wmm/sgwqt/swqsdocs.html. <u>Official verification of a surface water classification can be obtained from the Department's Bureau of Water Quality Standards and Assessment, P.O. 409, Trenton, NJ 08625.</u>

This report is divided into three parts. Part One of this report corresponds to the FW2 Trout Production (FW2-TP), FW2 Trout Maintenance (FW2-TM), and FW2 Non Trout (FW2-NT) classifications promulgated at N.J.A.C. 7:9B-1.15, with the following exceptions:

1. Some of the waters listed in Part One are classified in the SWQS as FW1 waters, Category 1 (C1) waters, Pinelands (PL) waters, saline waters of estuaries (SE), or as "Zones" of the mainstem Delaware River.

2. Some of the waters listed by name in the SWQS as FW2-TM or FW2-NT are not listed by name in Part One. In many cases where Part One lists an entire drainage as nontrout, individual waters in that drainage are listed by name in the SWQS. Even where Part One does not list an entire drainage as nontrout, there are some cases where the SWQS list FW2-TM or FW2-NT tributary waters that are not listed by name in Part One. However, the classifications of these waters in the SWQS are in Part One, through the use of the instructions presented below for the classification of waters that are not listed in Part One, are consistent.

To determine the classification of waters that are not listed in Part One, follow these instructions:

[1] Pursuant to N.J.A.C. 7:9B Surface Water Quality Standards, adopted June 20, 2005

1. Unnamed or unlisted streams that flow into trout production, trout maintenance, or nontrout streams take the classification of the streams they enter.

2. All lakes, ponds, and reservoirs that are five or more acres in surface area, and that are not specifically listed as trout production or trout maintenance waters, are classified as nontrout. This includes impoundments on the main stems of trout maintenance or trout production streams (e.g., Saxton Lake on the Musconetcong River and Lake Solitude on the South Branch of the Raritan River).

3. All lakes, ponds, and reservoirs that are less than five acres in surface area, and that are upstream of and contiguous with trout production or trout maintenance streams, are classified as trout maintenance.

4. Unnamed or unlisted streams that enter lakes, ponds, and reservoirs take the classification of either the listed tributary stream flowing into the lake with the highest classification or the listed tributary stream leaving the lake with the highest classification, whichever has the highest classification, or if there are no listed tributary or outlet streams to the lake, the first listed stream downstream of the lake.

These instructions are similar to instructions given at N.J.A.C. 7:9B-1.15(b) in the SWQS. Reclassification of streams, tributaries, lakes, ponds or reservoirs may occur if sufficient evidence warrants it.

A symbol preceding a water listed in Part One indicates the following:

- * Nontrout water is located upstream of and flows into a trout maintenance water (in some cases, via another nontrout water).
- ** Trout maintenance or nontrout water is located upstream of and flows into a trout production water (in some cases, via another trout maintenance or nontrout water).
- \+ Listing for all or part of this drainage would be changed if a potential change listed in Part Four is adopted.

Part Two ("List of New Jersey Trout Production Waters With Resident Reproducing Trout Species Identified") lists the specific trout species that have been identified as reproducing in each trout production stream listed in Part One and Part Three.

Part Three ("Potential Reclassifications of New Jersey Waters as Related to Their Suitability for Trout") lists changes to the classifications recommended by the Bureau of Freshwater Fisheries. These changes may become official when the SWQS are next officially revised.

PART ONE

Classification of New Jersey Waters as Related to Their Suitability for Trout

(For official surface water classifications consult N.J.A.C. 7:9B-1.15)

Alloway Creek Drainage

Non-trout Waters	Entire drainage

Assiscunk Creek Drainage

Non-trout Waters	Entire drainage

Assunpink Creek Drainage

Non-trout Waters	Entire drainage

Atlantic Ocean (Atlantic Co.) Drainage

Non-trout Waters	Entire drainage

Atlantic Ocean (Cape May Co.) Drainage

Non-trout Waters	Entire drainage

Arthur Kill (Middlesex Co.) Drainage

Non-trout Waters	Entire drainage

Arthur Kill (Union Co.) Drainage

Non-trout Waters	Entire drainage

Barnegat Bay (Ocean Co.) Drainage

Non-trout Waters	Entire drainage

Big Timber Creek Drainage

Trout Production Waters	
Masons Run (Pine Hill)	Source to Little Mill Road
Non-trout Waters	All other drainage

Blacks Creek Drainage

Non-trout Waters Entire drainage

Cedar Creek Drainage

Non-trout Waters Entire drainage

Cohansey River Drainage

Non-trout Waters Entire drainage

Cooper River Drainage

Non-trout Waters Entire drainage

Crosswicks Creek Drainage

Non-trout Waters Entire drainage

Delaware Bay (Cape May Co.) Drainage

Non-trout Waters Entire drainage

Delaware Bay (Cumberland Co.) Drainage

Non-trout Waters Entire drainage

Delaware and Raritan Canal (Mainstem and Feeder)

Non-trout Waters Entire length

Delaware River (Mainstem)

Non-trout Waters Entire length within New Jersey

Delaware River (Burlington Co.) Drainage

Non-trout Waters Entire drainage

Delaware River (Camden Co.) Drainage

Non-trout Waters Entire drainage

Delaware River (Gloucester Co.) Drainage

Non-trout Waters Entire drainage

Delaware River (Hunterdon Co.) Drainage

Trout Production Waters

Delaware River (trib.)(Holland)	Entire length
Hakihokake Creek (Milford)	Entire length (including headwaters known as Little York Creek (Brook))
Hakihokake Creek (trib.)(Wydner)	Entire length (source to confluence with Hakihokake Creek west of York Road
Little York (Brook) Creek (Little York) – See Hakihokake Creek	
Spring Mills Brook (Milford)	Entire length
Warford Creek (Barbertown)	Entire length

Trout Maintenance Waters

Alexauken Creek (Lambertville)	Entire length
Harihokake Creek (Frenchtown)	Rt. 519 bridge to Delaware River, including all tributaries
Lockatong Creek (Raven Rock)	Idell bridge to Delaware River
Plum Brook (Sergeantsville)	Entire length
Wichecheoke Creek (Stockton)	Confluence with Plum Brook to Delaware River

Non Trout Waters

* Harihokake Creek (Alexandria)	Source to Rt. 519 bridge, including all tributaries
* Lockatong Creek (Kingwood)	Source to Idell bridge
Nishisakawick Creek (Frenchtown)	Entire length
Swan Creek (Lambertville)	Entire length
* Wickecheoke Creek (Locktown)	Source to confluence with Plum Brook

Delaware River (Mercer Co.) Drainage

Trout Maintenance Waters

Fiddlers Creek (Titusville)	Entire length
Moore Creek (Hopewell)	Entire length

Non-trout Waters

Jacobs Creek (Hopewell)	Entire length

Delaware River (Sussex Co.) Drainage

Trout Production Waters

Clove (Mill) Brook (Montague)	Lake Marcia outlet to State line
Mill Brook (Montague) – see Clove Brook	
Sandyston Creek (Sandyston)	Entire length
Shimers Brook (Millville)	Entire length

	White Brook (Montague)	Entire length

Trout Maintenance Waters

**	Lake Marcia (High Point State Park)	-

Delaware River (Warren Co.) Drainage

Trout Production Waters

Buckhorn Creek (Hutchinson)	Entire length
Delawanna Creek (Delaware)	Delaware Lake dam downstream to Delaware River
Delaware River (trib.)(Knowlton)	Entire length
Dunnfield Creek (Del. Water Gap)	Entire length
Knowlton Brook (Knowlton)	Entire length
Lommasons Glen Brook (Lommasons Glen)	Entire length
Lopatcong Creek (Phillipsburg)	Source to a point 560 feet (straightline distance) upstream of the Penn Central railroad track, including all tributaries
Lopatcong Creek (trib.)(Uniontown)	Entire length
Pophandusing Creek (Hazen)	Source downstream to Rt. 519 bridge
Stony Brook (Knowlton)	Entire length
Van Campens Brook (Millbrook)	Entire length

Trout Maintenance Waters

**	Delawanna Creek (Delaware)	Source downstream to, but not including, Delaware Lake
	Lopatcong Creek (Phillipsburg)	From a point 560 feet (straightline distance) upstream of Penn Central railroad track downstream to the confluence with the Delaware River
	Pophandusing Creek (Belvidere)	Rt. 519 bridge downstream to confluence with the Delaware River

Elizabeth River Drainage

Non-trout Waters	Entire drainage

Flat Brook Drainage

Trout Production Waters

Beerskill (Shaytown)	Entire length
Big Flat Brook (Sandyston)	Confluence with Parker Brook downstream to confluence with Flat Brook
Big Flat Brook (trib.)(Tuttles Corner)	Outlet stream from Lake Ashroe to confluence

		with Big Flat Brook
	Flat Brook (Flatbrook-Roy)	Confluence of Big Flat Brook and Little Flat Brook downstream to the boundary of Flatbrook-Roy WMA
	Forked Brook (Stokes S.F.)	Entire length
	Little Flat Brook (Layton)	Entire length
	Parker Brook (Montague)	Entire length
	Shawanni Creek (Stokes S.F.)	Entire length
	Stony Brook (Stokes S.F.)	Entire length
	Tillman Brook (Walpack)	Entire length
	Tuttles Corner Brook (Tuttles Corner)	Entire length
	Trout Maintenance Waters	
	Flat Brook (Walpack)	Flatbrook-Roy WMA boundary downstream to Delaware River
**	Stony Lake (Stokes S.F.)	-
	Non-trout Waters	
**	Big Flat Brook (Montague)	Sawmill Pond to confluence with Parker Brook

Forked River Drainage

Non-trout Waters	Entire drainage

Great Egg Harbor River Drainage

Non-trout Waters	Entire drainage

Hackensack River Drainage

Trout Production Waters	
Cresskill Brook (Alpine)	Source to Duck Pond Road bridge, Demarest
Non-trout Waters	
Cresskill Brook (Demarest)	Duck Pond Road bridge to Tenakill Brook
Tenakill Brook (Demarest)	Entire length, including all tributaries except Cresskill Brook

Hudson River Drainage

Non-trout Waters	Entire drainage

Little Egg Harbor (Manahawkin Bay) Drainage

Non-trout Waters	Entire drainage

Manasquan River Drainage

Trout Maintenance Waters

	Manasquan River (Farmingdale)	Rt. 9 bridge to surf waters
	Mingamahone Brook (Farmingdale)	Entire length

Non-trout Waters

*	Bear Swamp Brook (Squankum)	Entire length
	Deep Creek (Herbertsville)	Entire length
*	Long Swamp Brook (Squankum)	Entire length
*	Manasquan River (Freehold)	Source to Rt. 9 bridge
*	Manasquan River (trib.)(Adelphia)	Entire length
*	Marsh Bog Brook (Farmingdale)	Entire length
*	Mill Run (Allaire S.P.)	Entire length
*	Mingamahone Brook, E/Br. (Farmingdale)	Entire length
*	Squankum Brook (Squankum)	Entire length
*	Timber Swamp Brook (Oak Glen)	Entire length

Mantua Creek Drainage

Non-trout Waters	Entire drainage

Maurice River Drainage

Non-trout Waters	Entire drainage

Metedeconk River Drainage

Trout Maintenance Waters

	Clear Stream (Jackson)	Entire length
	Metedeconk River, N/Br. (Lakewood)	Aldrich Road to Lanes Mills
	Muddy Ford Brook (Larrabee's Crossing)	Entire length
	Titmouse Brook (Howell)	Entire length

Non-trout Waters

	Cedar Bridge Branch (Lakewood)	Entire length
*	Dicks Brook (Larrabee's Crossing)	Entire length
*	Hay Stack Brook (Howell)	Entire length
*	Metedeconk River, N/Br. (Freehold)	Source to Aldrich Road, including all tributaries
	Metedeconk River, N/Br. (Brick)	Lanes Mills to confluence with S/Br. Metedeconk River
	Metedeconk River, S/Br. (Lakewood)	Entire length
	Metedeconk River (Brick)	Confluence of north and south branches to Barnegat Bay

Morses Creek Drainage

Non-trout Waters	Entire drainage

Mullica River Drainage

Non-trout Waters	Entire drainage

Musconetcong River Drainage

Trout Production Waters

Beatty's Brook (Penwell)	Entire length
Bowers Brook (Hackettstown)	Source downstream to Rt. 517
Hances Brook (Rockport)	Entire length
Kurtenbach's Brook (Waterloo)	Entire length
Mine Brook (Mt. Olive)	Lower Mine Brook Reservoir outlet downstream to Drakestown Road Bridge
Mine Brook (trib.)(Drakestown)	Source downstream to, but not including, Burd Reservoir
Mine Brook (trib.)(Washington)	Entire length of tributary which joins Mine Brook approximately 280 yards upstream of the confluence with the Musconetcong River
Musconetcong River (trib.)(Anderson)	Entire length
Musconetcong River (trib.)(Changewater)	Entire length
Musconetcong River (trib.)(Franklin)	Entire length
Musconetcong River (trib.)(Lebanon)	Entire length
Musconetcong River (trib.)(Port Murray)	Entire length
Musconetcong River (trib.)(S. of Point Mtn.)	Entire length
Musconetcong River (trib.)(S. of Schooley's Mtn. Brook)	Entire length
Musconetcong River (trib.)(Waterloo)	Tributary west of Kurtenbach's Brook from source downstream to Waterloo Valley Road bridge
Schooley's Mtn. Brook (Schooley's Mtn.)	Entire length
Stephensburg Creek (Stephensburg)	Entire length
Turkey Hill Brook (Bethlehem)	Entire length
West Portal (Brook) Creek (West Portal)	Entire length

Trout Maintenance Waters

Cranberry Lake (Byram)	-
Hatchery Brook (Hackettstown)	Entire length
Lake Hopatcong (Hopatcong)	-
Lubbers Run (Byram)	Entire length
** Mine Brook (Mt. Olive)	Source to, but not including, Upper Mine Brook Reservoir, downstream to Lower Mine Brook

	Reservoir outlet
Mine Brook (Hackettstown)	Drakestown Road bridge downstream to confluence with the Musconetcong River
Mine Brook (trib.)(Drakestown)	Burd Reservoir downstream to confluence with Mine Brook
Musconetcong River (Hackettstown)	Lake Hopatcong dam to Delaware River
Musconetcong River (trib.)(Deer Park Pond)	Deer Park Pond outlet stream downstream to Musconetcong River
Musconetcong River (trib.)(N. of Hackettstown)	Entire length
Trout Brook (Hackettstown)	Entire length
Weldon Brook (Jefferson Twp.)	From source to, but not including, Lake Shawnee
Wills Brook (Mt. Olive)	Entire length

<u>Non-trout Waters</u>

* Beaver Brook (Jefferson)	Source to, but not including, Lake Shawnee
* Cranberry Lake Outlet Stream (Byram)	Entire length
* Musconetcong River (trib.)(Deer Park Pond)	Source downstream to outlet of Deer Park Pond

Navesink River Drainage

<u>Trout Maintenance Waters</u>

Hockhocksen Brook (Colts Neck)	Entire length
Hop Brook – see Ramanessin Brook	
Pine Brook (Cooks Mill)	Entire length
Ramanessin (Hop) Brook (Holmdel)	Entire length

<u>Non-trout Waters</u>

Big Brook (Vanderberg)	Entire length
Mine Brook (Colts Neck)	Entire length
Willow Brook (Holmdel)	Entire length
Yellow Brook (Colts Neck)	Entire length

Newark Bay (Essex Co.) Drainage

<u>Non-trout Waters</u> Entire drainage

Newark Bay (Hudson Co.) Drainage

<u>Non-trout Waters</u> Entire drainage

Newark Bay (Union Co.) Drainage

Non-trout Waters	Entire drainage

Oldmans Creek Drainage

Non-trout Waters	Entire drainage

Oyster Creek Drainage

Non-trout Waters	Entire drainage

Passaic River Drainage

Trout Production Waters

Apshawa Brook (Macopin)	Entire length
Bear Swamp Brook (Mahwah)	Entire length
Beaver Brook (Meriden)	From Splitrock Reservoir Dam downstream to Meriden Road bridge
Beaver Brook (tribs.)(Meriden)	Entire length of two tributaries located approximately three quarters of a mile southwest of Meriden
Blue Mine Brook (Wanaque)	Headwaters downstream to lower Snake Den Road bridge
Burnt Meadow Brook (Stonetown)	Entire length
Clinton Brook (W. Milford)	Clinton Reservoir dam to Pequannock River
Clove Brook – see Stag Brook	
Cooley Brook (W. Milford)	Entire length
Crooked Brook (trib.)(E. of Sheep Hill)	Entire length
Den Brook (trib.)(Randolph)	Entire length (Tributary west of Shongum Lake)
Green Brook (West Milford)	Entire length
Green Pond Brook (Picatinny Arsenal)	Green Pond outlet to, but not including, Picatinny Lake
Harmony Brook (Brookside)	Entire length
Havemeyer Brook (Mahwah)	Entire length
Hewitt Brook (West Milford)	Entire length
Hibernia Brook (Marcella)	Source to first Green Pond Road bridge downstream of Lake Emma
Hibernia Brook (trib.)(Lake Ames)	Source to, but not including, Lake Ames
High Mountain Brook (Ringwood)	Source to, but not including, Skyline Lake
Indian Grove Brook (Bernardsville)	Entire length
Jackson Brook (Mine Hill)	Source to the boundary of Hurd Park, Dover
Jennings Creek (W. Milford)	State line to Wanaque River
Kanouse Brook (Newfoundland)	Entire length
Lake Stockholm Brook (Stockholm)	Entire length
Little Pond Brook (Oakland)	Entire length

	Macopin River (Newfoundland)	Echo Lake dam downstream to Pequannock River
	Meadow Brook (Wanaque)	E. Belmont Avenue downstream to Wanaque River
	Mill Brook (Randolph)	Source to Rt. 10 bridge
	Mill Brook (trib.)(N. of Union Hill)	Entire length
	Mossmans Brook (W. Milford)	Source to confluence with Clinton Reservoir
	Passaic River (Mendham)	Source downstream to, but not including, Osborn Pond
	Pequannock River (Vernon)	Source to confluence with Pacock Brook
	Pequannock River (Hardyston)	From Pacock Brook to, but not including, Oak Ridge Reservoir
	Pequannock River (Newfoundland)	Outlet of Oak Ridge Reservoir downstream to, but not including, Charlotteburg Reservoir
	Pequannock River (Charlotteburg)	Outlet of Charlotteburg Reservoir to, but not including, Macopin Reservoir
	Pequannock River (Kinnelon)	Macopin Reservoir outlet to Hamburg Turnpike bridge in Pompton Lakes Borough
	Pequannock River (trib.)(Copperas Mtn.)	Entire length
+	Pequannock River (trib.)(Maple Lake)	Entire length
	Pequannock River (trib.)(Smoke Rise)	Entire length
	Preakness (Singac) Brook (Wayne)	Source to, but not including, Barbour Pond
	Primrose Brook (Harding)	Source to Lees Hill Road bridge
	Ramapo River (trib.)(Oakland)	Entire length
	Russia Brook (trib.)(S. of St. Paul)	Entire length
+	Saddle River (Upper Saddle River)	State line to Bergen Co. Rt. 2 bridge
	Singac Brook – see Preakness Brook	
	Stag (Clove) Brook (Mahwah)	Entire length
	Wallace Brook (Randolph)	Source downstream to, but not including Hedden Park Lake
	Wanaque River (trib)(Hewitt)	Entire length of tributary south of Jennings Creek
	West Brook (W. Milford)	Entire length
	Whippany River (Brookside)	Source to Whitehead Road bridge
	Whippany River (trib.)(Brookside)	Entire length
	Whippany River (trib.)(Gillespie Hill)	Entire length

<u>Trout Maintenance Waters</u>

+	Beech Brook (West Milford)	From State line downstream to Monksville Reservoir
	Blue Mine Brook (Wanaque)	Lower Snake Den Road bridge to Wanaque Reservoir
	Boonton Reservoir – see Jersey City Res.	-
**	Canistear Reservoir (Vernon)	-
**	Charlotteburg Reservoir (Charlotteburg)	-
**	Clinton Reservoir (West Milford)	-
**	Green Pond (Rockaway)	-
	Greenwood Lake (W. Milford)	-

	Hibernia Brook (Hibernia)	First Green Pond Road bridge to confluence with Beaver Brook
	Jersey City Reservoir (Boonton)	-
	Mill Brook (Randolph)	Rt. 10 bridge downstream to Rockaway River, including the easterly tributary
	Monksville Reservoir (Long Pond Iron Works State Park)	-
**	Oak Ridge Reservoir (Oak Ridge)	-
	Ohio Brook (Morris Twp.)	Source downstream to Morristown town line
	Pequannock River (Riverdale)	Hamburg Turnpike bridge in Pompton Lakes Borough to confluence with Wanaque River
**	Pequannock River (trib.)(Lake Kampfe)	Source downstream to, but not including, Lake Kampfe
	Ringwood (Brook) Creek (Ringwood)	Entire length
	Rockaway River (Dover)	Washington Pond outlet downstream to Rt. 46 bridge
	Russia Brook (Milton)	Lake Hartung dam to, but not including, Lake Swannanoa
	Saddle River (Saddle River)	Bergen Co. Rt. 2 bridge to Allendale Rd. bridge
	Scarlet Oak Pond (Mahwah)	-
	Sheppard Lake (Ringwood)	-
**	Splitrock Reservoir (Rockaway)	-
	Wanaque Reservoir (Wanaque)	-
	Wanaque River (Wanaque)	Greenwood Lake outlet to the Monksville Reservoir dam at Stonetown Road
	Wanaque River (Pompton Lakes)	Wanaque Avenue bridge downstream to Pequannock River
	Whippany River (trib.)(E. of Brookside trib.)	Entire length
	Whippany River (trib.)(E. of Washington Valley)	Entire length

<u>Non-trout Waters</u>

*	Beaver Brook (Denville)	Meriden Road bridge to Rockaway River
*	Belcher Creek (West Milford)	Entire length
	Black Brook (Meyersville)	Entire length
**	Burnt Meadow Brook (Green Pond)	Source downstream to confluence with Green Pond Brook
	Canoe Brook (Chatham)	Entire length
**	Cherry Ridge Brook (Vernon)	Entire length
	Corys Brook (Warren)	Entire length
*	Cupsaw Brook (Skylands)	Entire length (Source to Wanaque Reservoir)
	Dead River (Liberty Corners)	Entire length
*	Den Brook (Randolph)	Entire length
	Fox Brook (Mahwah)	Entire length
	Goffle Brook (Hawthorne)	Entire length

	Grannis Brook (Morris Plains)	Entire length
	Great Brook (Chatham)	Entire length
*	Green Pond Brook (Wharton)	Outlet of Picatinny Lake to the confluence with the Rockaway River
	Harrisons Brook (Bernards)	Entire length
	Hohokus Brook (Hohokus)	Entire length
*	Jackson Brook (Dover)	Hurd Park to Rockaway River
	Kikeout Brook – see Stone House Brook	
	Loantaka Brook (Green Village)	Entire length
**	Macopin River (Newfoundland)	Source downstream to Echo Lake dam
	Meadow Brook (Wanaque)	Skyline Lake downstream to E. Belmont Avenue
	Mt. Tabor Brook (Morris Plains)	Entire length
**	Pacock Brook (Stockholm)	Source downstream to Pequannock River, except Canistear Reservoir
	Passaic River (Paterson)	Outlet of Osborn Pond to Newark Bay
+	Peckman River (Verona)	Entire length
	Pequannock River (Pompton Plains)	Confluence with Wanaque River downstream to confluence with Pompton River
**	Pequannock River (trib.)(Lake Kampfe)	Lake Kampfe to Pequannock River
	Pompton Lake (Pompton Lakes)	-
	Pompton River (Wayne)	Entire length
	Pond Brook (Oakland)	Entire length
	Posts Brook (Bloomingdale)	Entire length
	Preakness (Singnac) Brook (Barbour Pond)	Pond to Passaic River
	Primrose Brook (Harding)	Lees Hill Road bridge to Great Brook
	Rahway River (Rahway)	Entire length
	Ramapo River (Mahwah)	State line to Pompton River
*	Rockaway River (Wharton)	Source to Washington Pond outlet
	Rockaway River (Boonton)	Rt. 46 bridge to Passaic River, excluding Jersey City Reservoir
*	Russia Brook (Sparta)	Source to Lake Hartung dam
	Saddle River (Lodi)	Allendale Rd. bridge downstream to Passaic River
	Sawmill Creek (Pompton Plains)	Entire length
	Slough Brook (Livingston)	Entire length
	Spring Garden Brook (Florham)	Entire length
	Stephens Brook (Roxbury)	Entire length
+**	Stone House Brook (Kinnelon)	Entire length (a.k.a. Kikeout Brook)
*	Stony Brook (Boonton)	Entire length
**	Timber Brook (Kitchell)	Entire length
	Troy Brook (Troy Hills)	Entire length
+	Wanaque River (Pompton Lakes)	Wanaque Reservoir dam to Wanaque Avenue bridge
	Whippany River (Morristown)	Whitehead Rd. bridge to Rockaway River
	Whippany River (trib.)(Shongum Mtn.)	Entire length

Paulins Kill Drainage

Trout Production Waters

	Paulins Kill, E/Br. (Lafayette)	Limecrest quarry to confluence with W/Br. Paulins Kill
	Paulins Kill (trib.)(Emmons Sta.)	Entire length
	Paulins Kill (trib.)(Stillwater Sta.)	Entire length
	Roy Spring Brook – see Paulins Kill (trib.)(Stillwater Sta.)	
	Trout Brook (Middleville)	Source to confluence with Pond Brook
	Yards Creek (Blairstown)	Entire length

Trout Maintenance Waters

	Alms House Brook (Hampton)	Source downstream to, but not including, County Farm Pond
	Blair Creek (Hardwick Center)	Bass Lake outlet to Paulins Kill
	Culver's Creek (Frankford)	Entire length
	Culver's Lake (Frankford)	-
	Jacksonburg Creek (Blairstown)	Entire length
	Neldon Brook - see Swartswood Creek	
	Paulina Creek (Paulina)	Entire length
	Paulins Kill (Blairstown)	Confluence of E/Br. and W/Br. to Rt. 15 bridge (bench mark 507)
+	Paulins Kill (Paulins Kill Lake)	Paulins Kill Lake dam to Delaware River
	Paulins Kill (trib.)(Blairstown)	Entire length of tributary east of Walnut Valley
	Paulins Kill (trib.)(Stillwater)	Entire length
**	Sparta Junction Brook (Sparta Junction)	Entire length
	Swartswood Creek (Swartswood)	Entire length (a.k.a. Neldon Brook)
	Swartswood Lake (Stillwater)	-
	White Lake (Hardwick)	-

Non-trout Waters

*	Alms House Brook (Frankford)	County Farm Pond to Paulins Kill
*	Blair Creek (Hardwick)	Source to Bass Lake
*	Clearview Creek (Hampton)	Source to Alms House Brook
*	Dry Brook (Branchville)	Entire length
*	Little Swartswood Lake (Swartswood)	-
*	Paulins Kill (Hampton)	Rt. 15 bridge to Paulins Kill Lake dam
**	Paulins Kill, E/Br. (Andover)	Source to Limecrest quarry
**	Paulins Kill, E/Br. (trib.)(Sussex Mills)	Entire length
*	Paulins Kill, W/Br. (Newton)	Entire length
*	Pond Brook (Middleville)	Swartswood Lake outlet to Trout Brook
*	Trout Brook (Middleville)	Confluence with Pond Brook to Paulins Kill

Pennsauken Creek Drainage

	Non-trout Waters	Entire drainage

Pequest River Drainage

	Trout Production Waters	
	Barkers Mill Brook (Independence)	Entire length
	Bear Brook (Johnsonburg)	Entire length
	Furnace (Oxford) Brook (Oxford)	Source to railroad bridge at Oxford
	Independence Creek (Alphano)	Source to Alphano Road
	Pequest River (trib.)(Petersburg)	Headwaters and tributaries downstream to Ryan Road bridge
	Trout Brook (Tranquility)	Entire length
	Tunnel Brook (Oxford Mountain.)	Entire length, including all tributaries
	Trout Maintenance Waters	
	Andover Junction Brook (Andover)	Entire length
	Bear Creek (Johnsonburg)	Entire length
	Brookaloo Swamp (Hope)	Entire length
**	Furnace Lake (Oxford)	-
	Gardners Lake (Andover)	-
	Honey Run (Hope)	Entire length
	Lake Aeroflex – see New Wawayanda Lake	
	Lake Illif (Andover)	-
	Mountain Lake (Liberty)	-
	Mountain Lake Creek (Brook) (Liberty)	Source to Mountain Lake
	Lake Aeroflex – see New Wawayanda Lake	
	New Wawayanda Lake (Andover)	-
	Pequest River (Tranquility)	Source to Tranquility bridge
	Pequest River (Townsbury)	The upstream most boundary of Pequest WMA to Delaware River
	Pequest River (trib.)(Janes Chapel)	Entire length including headwaters and tributaries
	Silver Lake (Hope)	-
	Tar Hill Brook (Lake Lenape)	Source to, but not including, Lake Lenape
	Trout Brook (Hope)	Entire length
	Non-trout Waters	
**	Allamuchy Creek (Allamuchy)	Entire length
*	Beaver Brook (Hope)	Entire length
*	Furnace Brook (Oxford)	Railroad bridge to Pequest River
*	Independence Creek (Alphano)	Alphano Road to Pequest River
*	Kymer Brook (Andover)	Entire length
*	Mountain Lake Brook (White)	Mountain Lake dam to Pequest River

*	Muddy Brook (Hope)	Entire length
*	Pequest River (Vienna)	Tranquility bridge to the upstream most boundary of the Pequest WMA
*	Tar Hill Brook (Lake Lenape)	Lake Lenape to Andover Junction Brook
*	Trout Brook (Allamuchy)	Entire length

Pochuck Creek Drainage

Trout Production Waters

	Black Creek (trib.)(McAfee)	Entire length
	Livingston Ponds Brook (Wawayanda S.P.)	Source downstream to State line
	Spring Brook (Maple Grange)	Entire length

Trout Maintenance Waters

	Black Creek (McAfee)	Source to Rt. 94 bridge
	Glenwood Brook (Glenwood)	Outlet of Glenwood Lake to State line
	Lounsberry Hollow Brook (Vernon Valley)	Outlet of Glenwood Lake to Pochuck Creek
	Town Brook (Vernon)	Entire length
	Wawayanda Creek (Vernon)	State line to Pochuck Creek
	Wawayanda Lake (Wawayanda)	-

Non-trout Waters

	Black Creek (Vernon)	Rt. 94 bridge to Pochuck Creek
	Black Creek (trib.)(Vernon Valley)	Entire length
*	Longhouse Brook (Upper Greenwood Lake)	Source to State line
	Pochuck Creek (Vernon)	Source to State line
*	Sawmill Pond Brook (West Milford)	Entire length
*	Wawayanda Creek (trib.)(Wawayanda)	Source to State line

Pohatcong Creek Drainage

Trout Production Waters

	Brass Castle Creek (Brass Castle)	Entire length
	Halfway House Brook (Franklin)	Entire length
	Merrill Creek (Harmony)	Entire length, but not including Merrill Creek Reservoir
	Mill Brook (Broadway)	Entire length
	Pohatcong Creek (Mansfield)	Source to Karrsville bridge, including all tributaries
	Pohatcong Creek (Springtown)	Rt. 519 bridge to Delaware River
	Pohatcong Creek (trib.)(Greenwich)	Entire length
	Pohatcong Creek (trib.)(New Village)	Entire length
	Pohatcong Creek (trib.)(Willow Grove)	Entire length

Trout Maintenance Waters

**	Merrill Creek Reservoir (Harmony)	-
**	Pohatcong Creek (Pohatcong)	Karrsville bridge to Rt. 519 bridge
	Shabbecong Creek (Washington)	Entire length

Raccoon Creek Drainage

Non-trout Waters — Entire drainage

Rahway River Drainage

Non-trout Waters — Entire drainage

Rancocas Creek Drainage

Non-trout Waters — Entire drainage

Raritan Bay (Middlesex Co.) Drainage

Non-trout Waters — Entire drainage

Raritan Bay (Monmouth Co.) Drainage

Non-trout Waters — Entire drainage

Raritan River Drainage

Trout Production Waters

Beaver Brook (Cokesbury)	Source to Reformatory Road bridge
Beaver Brook (Annandale)	Beaver Avenue bridge downstream to the lowermost I-78 bridge
Black Brook (Polktown)	Entire length
Black River – see Lamington River	
Boulder Hill Brook (Tewksbury)	Entire length
Burnett Brook (Ralston)	Entire length
Capoolong (Cakepoulin) Creek (Sydney)	Entire length
Cold Brook (Oldwick)	Entire length
Dawsons Brook (Ironia)	Entire length
Drakes Brook (trib.)(Mt. Olive)	Source downstream to Central Railroad bridge
Electric Brook (Schooley's Mtn.)	Entire length
Flanders Brook (Flanders)	Entire length
Frog Hollow Brook (Califon)	Entire length
Gladstone Brook (St. Bernards School)	Entire length
Guinea Hollow Brook (Tewksbury)	Entire length
Hacklebarney Brook (Hacklebarney)	Entire length
Herzog (Lomerson) Brook (Pottersville)	Entire length

Hickory Run (Califon)	Entire length
Hollow Brook (Pottersville)	Entire length
India Brook (Randolph Twp.)	Entire length
Krueger's (Creek) Brook (Flanders)	Entire length
Lamington (Black) River (Pottersville)	Confluence with Rhinehart Brook to Camp Brady bridge, Bedminster
Lamington (Black) River (trib.)(Ironia)	Source downstream to, but not including, Bryant Pond
Ledgewood Brook (Ledgewood)	Entire length
Little Brook (Califon)	Entire length
Lomerson Brook – see Herzog Brook	
Mine Brook (trib.)(E. of Mine Mtn.)	Entire length
Mine Brook (trib.)(S. of Mine Mtn.)	Source downstream to Douglass Road bridge
Mulhockaway Creek (Pattenburg)	Entire length
Norton Brook (Norton)	Entire length
Oakdale Creek (Chester)	Entire length
Peapack Brook (Gladstone)	Entire length
Raritan River, N/Br. (Pleasant Valley)	Source to, but not including, Ravine Lake (also see India Brook)
Raritan River, S/Br. (Middle Valley)	Confluence with Turkey Brook to Rt. 512 bridge
Raritan River, S/Br. (trib.)(Long Valley)	Entire length
Raritan River, S/Br. (trib.)(S. of Hoffmans)	Entire length
Raritan River, S/Br. (trib.)(S. of Schooleys Mtn.)	Entire length
Rinehart Brook (Hacklebarney)	Entire length
Rockaway Creek (N/Br.)(Mountainville)	Source to Rt. 523 bridge
Rockaway Creek, S/Br. (Clinton)	Headwaters to Readington Township boundary, including all tributaries
Rocky Run (Lebanon Twp.)	Entire length
Round Valley Reservoir (Clinton)	-
Spruce Run (Glen Gardner)	Source to, but not including, Spruce Run Reservoir
Stony Brook (Washington)	Entire length
Sun Valley Brook (Mt. Olive)	Entire length
Teetertown Brook (Lebanon)	Entire length
Trout Brook (Hacklebarney)	Entire length
Turkey Brook (Mt. Olive)	Entire length
Willoughby Brook (Buffalo Hollow)	Entire length

<u>Trout Maintenance Waters</u>

** Beaver Brook (Annandale)	Reformatory Road bridge to Beaver Avenue bridge
Beaver Brook (Clinton)	Lower most I-78 bridge downstream to the S/Br. Raritan River
Black River – see Lamington River	
Budd Lake (trib.)(E. of Budd Lake)	Entire length

	Buskill Brook (Flemington)	Source and tributary downstream to Rt. 31 bridge
**	Drakes Brook (Ledgewood)	Source downstream to Hillside Ave. bridge
	Green Brook (Watchung)	Source to Rt. 22 bridge
**	Lamington River (Milltown)	Rt. 206 bridge to confluence with Rinehart Brook
	Lamington River (Vliettown)	Camp Brady bridge to Rt. 523 bridge
**	McVickers Brook (Mendham)	Entire length
	Middle Brook, E/Br. (Springdale)	Entire length
	Prescott Brook (Stanton Station)	Entire length
	Raritan River, N/Br. (Far Hills)	Ravine Lake dam to Rt. 512 bridge
**	Raritan River, S/Br. (Mt. Olive)	Dam (located 390 feet upstream of the Flanders-Drakestown Road bridge) to confluence with Turkey Brook
	Raritan River, S/Br. (Califon)	Rt. 512 bridge downstream to downstream end of Packers Island
	Raritan River, S/Br. (trib.)(High Bridge)	Entire length
	Rockaway Creek, N/Br. (Whitehouse)	Rt. 523 bridge to confluence with S/Br. Rockaway Creek
	Rockaway Creek, S/Br. (Clinton/ Whitehouse)	Readington Township boundary to confluence with N/Br. Rockaway Creek, excluding Lake Cushetunk
	Spruce Run (Clinton)	Spruce Run Reservoir dam to S/Br. Raritan River
	Spruce Run Reservoir (Union)	-
	Walnut Brook (Flemington)	Entire length

<u>Non-trout Waters</u>

*	Allerton Creek (Allerton)	Entire length
	Ambrose Brook (Piscataway)	Entire length
	Assiscong Creek (Flemington)	Entire length
	Back Brook (Vanliew's Corners)	Entire length
	Barclay Brook (Redshaw Corners)	Entire length
	Bear Brook (West WIndsor)	Entire length
	Beden Brook (Montgomery)	Entire length
	Black River – see Lamington River	
*	Blue Brook (Mountainside)	Entire length
	Bound Brook (Dunellen)	Entire length
**	Budd Lake (trib.)(W. of Budd Lake)	Entire length
	Buskill Brook (Flemington)	Rt. 31 bridge downstream to S/Br. Raritan River
	Cedar Brook (Spotswood)	Entire length
	Chambers Brook (Whitehouse)	Entire length
*	Cramers Creek (Hamden)	Entire length
	Cranbury Brook (Old Church)	Entire length
	Cruser Brook (Montgomery)	Entire length
	Deep Run (Old Bridge)	Entire length
	Devils Brook (Schalks)	Entire length
**	Drakes Brook (Flanders)	Hillside Avenue bridge to confluence with S/Br. Raritan River

	Duck Pond Run (Port Mercer)	Entire length
	Dukes Brook (Somerville)	Entire length
**	Flanders Canal (Flanders)	Entire length
	Gander Brook (Manalapan)	Entire length
	Grandin Brook – see Sidney Brook	
	Green Brook (Plainfield)	Rt. 22 bridge to Bound Brook
	Heathcote Brook (Kingston)	Entire length
	Holland Brook (Readington)	Entire length
	Hoopstick Brook (Bedminster)	Entire length
	Ireland Brook (Paulus Corner)	Entire length
	Iresick Brook (Spotswood)	Entire length
**	Lamington (Black) River (Succasunna)	Source downstream to Rt. 206 bridge
	Lamington (Black) River (Burnt Mills)	Rt. 523 to N/Br. Raritan River
	Lawrence Brook (Deans)	Entire length
	Manalapan Brook (Jamesburg)	Entire length
	Matchaponix Brook (Mount Mills)	Entire length
	McGellairds Brook (Englishtown)	Entire length
	Middle Brook, W/Br. (Martinsville)	Entire length
	Middle Brook (Bound Brook)	Confluence of East and West branches to Raritan River
	Middle Brook (Greater Cross Roads)	Entire length
	Milford Brook (Lafayette Mills)	Entire length
	Millstone River (Hightstown)	Entire length
	Mine Brook (Mine Brook)	Entire length
	Neshanic River (Reaville)	Entire length
	Oakeys Brook (Deans)	Entire length
	Peters Brook (Somerville)	Entire length
	Pike Run (Belle Meade)	Entire length
	Pine Brook (Clarks Mills)	Entire length
	Pleasant Run (Readington)	Entire length
	Raritan River (Bound Brook)	From confluence of North and South branches to Landing Lane bridge, New Brunswick
	Raritan River, N/Br. (Bedminster)	Rt. 512 bridge to confluence with S/Br. Raritan River
**	Raritan River, S/Br. (Mt. Olive)	Source downstream to the dam that is 390 feet upstream of the Flanders-Drakestown Road bridge
	Raritan River, S/Br. (Neshanic Station)	Downstream end of Packers Island to confluence with N/Br. Raritan River
	Raritan River, S/Br. (trib.)(E. of Three Bridges)	Entire length
	Raritan River, S/Br. (trib.)(Holcomb Mills)	Entire length
	Raritan River, S/Br. (trib.)(W. of Three Bridges)	Entire length
	Rock Brook (Montgomery)	Entire length
	Rockaway Creek (Whitehouse)	Confluence of North and South Branches to

		Lamington River
	Royce Brook (Manville)	Entire length
+	Sidney Brook (Grandin)	Entire length
	Simonson Brook (Griggstown)	Entire length
	Six Mile Run (Franklin Church)	Entire length
	Spooky Brook (Bound Brook)	Entire length
	Stony Brook (Hopewell)	Entire length
	Stony Brook (Watchung)	Entire length
**	Tanners Brook (Washington)	Entire length
	Ten Mile Run (Franklin)	Entire length
	Tennent Brook (Old Bridge)	Entire length
	Tepehemus Brook (Manalapan)	Entire length
**	Turtleback Brook (Middle Valley)	Entire length
	Weamaconk Creek – see Matchaponix Brook	
	Wemrock Brook (Millhurst)	Entire length

Salem River (Creek) Drainage

Non-trout Waters	Entire drainage

Shark River Drainage

Trout Maintenance Waters

Shark River (Neptune)	Rt. 33 bridge to Remsen Mill Road

Non-trout Waters

*	Jumping Brook (Neptune)	Entire length
*	Reevy Branch (Reevytown)	Entire length (source to confluence with Shark River)
*	Shark River (Colts Neck)	Source to Rt. 33
	Shark River (Glendola)	Remsen Mill Road to Atlantic Ocean

Shrewsbury River Drainage

Non-trout Waters	Entire drainage

Stow Creek Drainage

Non-trout Waters	Entire drainage

Toms River Drainage

Trout Maintenance Waters

Toms River (Van Hiseville/ Whitesville/	Rt. 528 bridge (Cassville) to Rt. 571 bridge in

Manchester)	Whitesville

Non-trout Waters

	Davenport Brook (Berkeley)	Entire length
*	Dove's Mill Branch (Holmansville)	Entire length
	Jakes Branch (Berkeley)	Entire length
*	Long Brook (Jackson Twp.)	Entire length
*	Maple Root Branch (Jackson)	Entire length
*	Toms River (Holmeson)	Source to Rt. 528 bridge, Cassville
	Toms River (Toms River)	Rt. 571 to Barnegat Bay

Tuckahoe River Drainage

Non-trout Waters	Entire drainage

Wallkill River Drainage

Trout Production Waters

Franklin Pond Creek (Hardyston Twp.)	Entire length (source to, but not including Franklin Pond)
Mud Pond Outlet Stream (Hamburg)	Entire length (from the Mud Pond dam downstream to confluence with Hamburg Creek)
Sparta Glen Brook (Sparta)	Entire length
Wallkill River (trib.)(Ogdensburg)	Tributary from the outlet of Heaters Pond to the confluence with the Wallkill River)
Wallkill River (trib.)(Sparta)	Lake Saginaw dam downstream to Wallkill River

Trout Maintenance Waters

Clove Creek (Colesville)	Entire length
Clove Brook (Wantage)	Source to, but not including, Clove Acres Lake
Hamburg Creek (Hamburg Mtn.)	Source to Rt. 517 bridge, Rudeville
Lake Rutherford (Wantage)	-
Papakating Creek (Frankford)	Source to Rt. 629 bridge
Quarryville Brook – see Willow Brook	
Wallkill River (Franklin)	Sparta Glen Brook to, but not including, Franklin Pond
White Lake (Sparta)	-
Willow (Quarryville) Brook (Wantage)	Entire length

Non-trout Waters

Beaver Run (Wantage)	Entire length
Clove Brook (Sussex)	Clove Acres Lake to Papakating Creek
Hamburg Creek (Hardistonville)	Rt. 517 bridge to Wallkill River
Hanford Brook (Hanford)	Entire length within New Jersey
Papakating Creek (Wantage)	Rt. 629 bridge downstream to Wallkill River

	Papakating Creek (trib.)(Pellettown)	Entire length
	Papakating Creek, W/Br. (Wantage)	Entire length
*	Wallkill River (Sparta)	Source to confluence with Sparta Glen Brook
	Wallkill River (Wantage)	Outlet of Franklin Pond to State line
	Wantage Brook (Wantage)	Entire length
	Wildcat Brook (Franklin)	Entire length

Wreck Pond Creek Drainage

Non-trout Waters	Entire drainage

PART TWO

List of New Jersey Trout Production Waters with Resident Reproducing Trout Species Identified

	Trout Species		
	Brook	Brown	Rainbow
Big Timber Creek Drainage			
Masons Run (Pine Hill)	x		
Delaware River (Hunterdon Co.) Drainage			
Delaware River (trib.)(Holland)		x	
Hakihokake Creek (Milford)		x	
Hakihokake Creek (trib.)(Wydner)		x	
Little York (Brook) Creek (Little York)		x	
Spring Mills Brook (Milford)		x	
Warford Creek (Barbertown)		x	
Delaware River (Sussex Co.) Drainage			
Clove (Mill) Brook (Montague)		x	
Sandyston Creek (Sandyston)	x		
Shimers Brook (Millville)	x		
White Brook (Montague)	x		
Delaware River (Warren Co.) Drainage			
Buckhorn Creek (Hutchinson)		x	
Delawanna Creek (Delaware)		x	
Delaware River (trib.)(Knowlton)		x	
Dunnfield Creek (Del. Water Gap)	x	x	
Knowlton Brook (Knowlton)		x	
Lommasons Glen Brook (Lommasons Glen)	x		
Lopatcong Creek (Allen Mills)	x	x	
Lopatcong Creek (Phillipsburg)		x	
Lopatcong Creek (trib.)(Uniontown)	x		
Pophandusing Creek (Hazen)		x	
Stony Brook (Knowlton)	x	x	
Van Campens Brook (Millbrook)	x	x	x
Flat Brook Drainage			
Beerskill (Shaytown)	x		
Big Flat Brook (Sandyston)	x	x	
Big Flat Brook (trib.)(Tuttles Corner)	x		
Flat Brook (Blewett Tract)		x	
Forked Brook (Stokes S.F.)	x		

	Trout Species		
	Brook	Brown	Rainbow
Little Flat Brook (Layton)	x	x	
Parker Brook (Montague)	x		
Shawanni Creek (Stokes S.F.)	x		
Stony Brook (Stokes S.F.)	x		
Tillman Brook (Walpack)	x		
Tuttles Corner Brook (Tuttles Corner)	x		
Hackensack River Drainage			
Cresskill Brook (Alpine)	x		
Musconetcong River Drainage			
Beatty's Brook (Penwell)	x	x	
Bowers Brook (Hackettstown)	x		
Hances Brook (Rockport)	x		
Kurtenbach's Brook (Waterloo)	x		
Mine Brook (Mt. Olive)	x	x	
Mine Brook (trib.)(Drakestown)	x		
Mine Brook (trib.)(Washington)	x		
Musconetcong River (trib.)(Anderson)	x		
Musconetcong River (trib.)(Changewater)	x	x	
Musconetcong River (trib.)(Franklin)	x	x	
Musconetcong River (trib.)(Lebanon)	x		
Musconetcong River (trib.)(Port Murray)	x	x	
Musconetcong River (trib.)(S. of Point Mtn.)	x	x	
Musconetcong River (trib.)(S. of Schooley's Mtn. Brook)	x		
Musconetcong River (trib.)(Waterloo)	x		
Schooley's Mtn. Brook (Schooley's Mtn.)	x		
Stephensburg Creek (Stephensburg)	x		
Turkey Hill Brook (Bethlehem)		x	
West Portal (Brook) Creek (West Portal)	x	x	
Passaic River Drainage			
Apshawa Brook (Macopin)		x	
Bear Swamp Brook (Mahwah)	x		
Beaver Brook (Meriden)	x		
Beaver Brook (tribs.)(Meriden)	x		
+ Beech Brook (West Milford)	x		
Blue Mine Brook (Wanaque)	x		
Burnt Meadow Brook (Stonetown)	x		
Clinton Brook (W. Milford)		x	
Cooley Brook (W. Milford)	x		
Crooked Brook (trib.)(E. of Sheep Hill)	x		

	Trout Species		
	Brook	Brown	Rainbow
Den Brook (trib.)(Randolph)	x		
Green Brook (West Milford)	x		
Green Pond Brook (Picatinny Arsenal)	x		
Harmony Brook (Brookside)		x	x
Havemeyer Brook (Mahwah)	x		
Hewitt Brook (West Milford)	x		
Hibernia Brook (Marcella)	x		
Hibernia Brook (trib.)(Lake Ames)	x		
High Mountain Brook (Ringwood)	x		
Indian Grove Brook (Bernardsville)			x
Jackson Brook (Mine Hill)		x	
Jennings Creek (W. Milford)	x		
Kanouse Brook (Newfoundland)	x		
Lake Stockholm Brook (Stockholm)	x		
Little Pond Brook (Oakland)	x	x	
Macopin River (Newfoundland)		x	
Meadow Brook (Wanaque)		x	
Mill Brook (Randolph)		x	
Mill Brook (trib.)(N. of Union Hill)		x	
Mossmans Brook (W. Milford)		x	
Passaic River (Mendham)		x	x
Pequannock River (Vernon)	x		
Pequannock River (Hardyston)		x	
Pequannock River (Newfoundland)		x	
Pequannock River (Kinnelon)		x	
Pequannock River (trib.)(Copperas Mtn.)	x	x	
+ Pequannock River (trib.)(Maple Lake)		x	
Pequannock River (trib.)(Smoke Rise)	x		
Preakness (Singac) Brook (Wayne)	x		
Primrose Brook (Harding)	x	x	
Ramapo River (trib.)(Oakland)	x		
Russia Brook (trib.)(S. of St. Paul)	x		
Saddle River (Upper Saddle River)		x	
Stag (Clove) Brook (Mahwah)	x		
+ Stone House Brook		x	
Wallace Brook (Randolph)		x	
Wanaque River (trib.)(S. of Jennings Creek)	x		
West Brook (W. Milford)			x
Whippany River (Brookside)		x	x
Whippany River (trib.)(Brookside)		x	x
Whippany River (trib.)(Gillespie Hill)			x

	Trout Species		
	Brook	Brown	Rainbow
Paulins Kill River Drainage			
Paulins Kill, E/Br. (Lafayette)			x
Paulins Kill (trib.)(Emmons Sta.)		x	
Paulins Kill (trib.)(Stillwater Sta.)	x		
Trout Brook (Middleville)		x	
Yards Creek (Blairstown)		x	
Pequest River Drainage			
Barkers Mill Brook (Independence)	x		
Bear Brook (Johnsonburg)	x		
Furnace (Oxford) Brook (Oxford)		x	
Independence Creek (Alphano)	x		
Pequest River (trib.)(Petersburg)	x		
Trout Brook (Tranquility)	x		
Tunnel Brook (Oxford Mtn.)	x		
Pochuck River Drainage			
Black Creek (trib.)(McAfee)	x		
Livingston Ponds Brook (Wawayanda S.P.)	x	x	
Spring Brook (Maple Grange)	x		
Pohatcong Creek Drainage	x	x	
Brass Castle Creek (Brass Castle)	x	x	
Halfway House Brook (Franklin)	x		
Merrill Creek (Harmony)	x		
Mill Brook (Broadway)	x		
Pohatcong Creek (Mansfield)		x	
Pohatcong Creek (Springtown)		x	
Pohatcong Creek (trib.)(Greenwich)	x	x	
Pohatcong Creek (trib.)(New Village)	x		
Pohatcong Creek (trib.)(Willow Grove)	x		
Raritan River Drainage			
Beaver Brook (Cokesbury)		x	
Black Brook (Polktown)		x	x
Black River – see Lamington River		x	
Boulder Hill Brook (Tewksbury)		x	
Burnett Brook (Ralston)		x	
Capoolong (Cakepoulin) Creek (Sydney)		x	
Cold Brook (Oldwick)		x	
Dawsons Brook (Ironia)		x	
Drake’s Brook (trib.)(Mt. Olive)	x		

	Trout Species		
	Brook	Brown	Rainbow
Electric Brook (Schooley's Mtn.)	x	x	
Flanders Brook (Flanders)	x	x	x
Frog Hollow Brook (Califon)	x		
Gladstone Brook (St. Bernards School)		x	
Guinea Hollow Brook (Tewksbury)		x	
Hacklebarney Brook (Hacklebarney)	x		
Herzog (Lomerson) Brook (Pottersville)	x	x	
Hickory Run (Califon)			x
Hollow Brook (Pottersville)	x	x	
India Brook (Randolph Twp.)	x	x	
Krueger's (Creek) Brook (Flanders)	x		
Lamington (Black) River (Pottersville)		x	
Lamington (Black) River (trib.)(Ironia)	x		
Ledgewood Brook (Ledgewood)		x	
Little Brook (Califon)	x		
Mine Brook (trib.)(E. of Mine Mtn.)	x		
Mine Brook (trib.)(S. of Mine Mtn.)	x		
Mulhockaway Creek (Pattenburg)	x	x	x
Norton Brook (Norton)	x		
Oakdale Creek (Chester)	x		
Peapack Brook (Gladstone)		x	
Raritan River, N/Br. (Pleasant Valley)		x	
Raritan River, S/Br. (Middle Valley)	x	x	
Raritan River, S/Br. (trib.)(Long Valley)	x		
Raritan River, S/Br. (trib.)(S. of Hoffmans)	x		
Raritan River, S/Br. (trib.)(S. of Schooleys Mtn.)	x		
Rinehart Brook (Hacklebarney)	x	x	
Rockaway Creek (N/Br.)(Mountainville)	x	x	
Rockaway Creek (S/Br.)(Lebanon)		x	
Rocky Run (Lebanon Twp.)	x		
Round Valley Reservoir (Clinton)		- (lake trout) -	
Spruce Run (Glen Gardner)	x	x	
Stony Brook (Washington)	x	x	
Sun Valley Brook (Mt. Olive)	x		
Teetertown Brook (Lebanon)	x	x	
Trout Brook (Hacklebarney)	x		
Turkey Brook (Mt. Olive)	x		
Willoughby Brook (Buffalo Hollow)	x	x	

Wallkill River Drainage

Franklin Pond Creek (Hardyston Twp.)	x	x	
Mud Pond Outlet Stream (Hamburg)	x		

	Trout Species		
	Brook	Brown	Rainbow
Sparta Glen Brook (Sparta)	x		
Wallkill River (trib.)(Ogdensburg)	x		
Wallkill River (trib.)(Sparta)	x		

\+ Listing of this stream as trout production in the NJDEP Surface Water Quality Standards may be proposed in the future. See Part Four for list of potential reclassifications.

NOTE: Some of the streams listed in Part Two are not trout production streams for their entire length. See Part One and Part Three for further information.

PART THREE

Potential Reclassifications of New Jersey Trout Waters as related to Their Suitability for Trout

Drainage and Waterbody Description	Current Classification[1]	Potential Classification
Passaic River Drainage		
Beech Brook (West Milford) Entire length, including headwaters and tributaries	Trout Maintenance	Trout Production
Peckman River (Verona) From a point 1,300 feet (straight line distance) upstream of Ozone Avenue bridge to Main Street bridge	Nontrout	Trout Maintenance
Pequannock River (trib.) (Maple Lake) Entire length, including all tributaries	[Trout Production]	Trout Production
Saddle River (Upper Saddle River) County Rt. 2 (Lake Street) bridge downstream to confluence with Pleasant Brook	Trout Maintenance	Trout Production
Stone House Brook (Butler) (a.k.a. Kikeout Brook) Valley Road bridge downstream to confluence with Pequannock River	Nontrout	Trout Production
Paulinkill River Drainage		
Paulinkill River (trib) (E. of Hainesburg Station) Entire length	[Trout Maintenance]	Trout Maintenance
Paulinkill River (trib) (E. of Vail) Source downstream to confluence with outlet stream of Lake Susquehanna	[Trout Maintenance]	Trout Maintenance
Raritan River Drainage		
Sidney Brook (Grandin) Headwaters downstream to Rt. 513 bridge, including all tributaries	Nontrout	Trout Maintenance

[1] Brackets around a current classification indicate that the waterbody is not specifically named or listed in Part One and has, therefore, by default, assumed the classification given herein (see the "General Explanation" in Part 1 for instructions for classification of unlisted waters).

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APPENDIX D

New Jersey Division of Fish & Wildlife - Field Data Sheets

NEW JERSEY DIVISION OF
Fish and Wildlife

This is supplemental sheet ☐ of ☐

SUPPLEMENTAL FIELD SURVEY SHEET - FISH SAMPLES

Site Name: ______ **Date:** ______

County: ______

Location: ______

Sample #	Species Name	Number	Length (mm)	Weight (kg)	Condition	Scale Sample?	Age	Sex
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NEW JERSEY DIVISION OF Fish and Wildlife

NEW JERSEY DIVISION OF FISH AND WILDLIFE
BUREAU OF FRESHWATER FISHERIES
STREAM SURVEY DATA SHEET
Version 3.2

☐ Entered
Date:

Waterbody:
Alt. Name:
County:
Municipality:
Drainage:
WMA:
Date:
Crew:
Weather:
Air Temp: °C

Reason: (Please circle one)

Classification	Other ________	Species Mgmt.	Trout Prod Inventory
Fish Kill	Reproduction Check	Species Study ______________	Update File
Fish Salvage	Reques	Stream Encroachment Review	
IBAA			

Location:

LATDEG: LONDEG:
LATMIN: LONMIN:
LATSEC: LONSEC:

Take one GPS reading at mid-point of survey stretch

Classification: USGS Quad:

Stream Depth: m. Stream Width: m. Sample Length: m. Time: sec.

Electrofishing Gear: (Please circle one)

Type VII POW SR Backpack (DC)	Type LR-24 Backpack (DC)	14' Coffelt Boat	14.5 Smith Root Boat
Type VII SR Backpack (DC)	Three Paddle Stream Rig (AC)	14 Smith Root Boat	12' Whip Attenna Boat
Model 12-B Backpack (DC)	Two Paddle Stream Rig (AC) (DC)		

C flashing - specific conductance

Water Chemistry

Time (military)	D.O. (mg/l)	Temperature °C	pH	Conductivity (µS/cm)	Alkalinity (mg/l)	Specific Conductance

Habitat Information

Abundance	*Substrate*
%	
%	
%	

Shade Index
☐ Open ☐ Scattered ☐ Moderate
☐ Complete ☐ Heavy

Notes

Incidence of Occurrence

Species	Number	Incidence Occurrence	Value
Bass, Largemouth		8.8	
Bass, Rock		15.6	
Bass, Smallmouth		9.7	
Bluegill		6.5	
Bullhead, Brown		6.9	
Carp		0.0	
Creek Chub		30.7	
Creek Chubsucker		1.1	
Dace, Blacknose		32.1	
Dace, Longnose		37.7	
Darter, Tessellated		13.4	
Eel, American		14.1	
Fallfish		17.6	
Goldfish		11.1	
Killifish		0.0	
Minnow, Cutlips		3.7	
Mudminnow		4.9	
Perch, Yellow		0.0	
Pickerel, Chain		3.4	
Pickerel, Redfin		7.6	
Pumpkinseed		15.9	
Redbreast Sunfish		6.3	
Sculpin, Slimy		90.0	
Shiner, Common		9.1	
Shiner, Golden		1.9	
Shiner, Satinfin		5.3	
Stonecat		0.0	
Sucker, White		19.0	
Sunfish, Green			
Trout, Brook		100.0	
Trout, Brown		100.0	
Trout, Rainbow		100.0	
		Total	
	Number of Species		
		Average	

Equipment Checklist:

- Rubber Gloves
- Buckets
- Nets
- D.O. Meter
- pH Meter
- Conductivity Meter
- Measuring Tape (300')
- Measuring Board
- Meter Stick
- Alkalinity Bottle (500ml)
- Sample Cooler
- pH Calibration Packets
- GPS Unit
- Clipboard
- Datasheets
- Styrofoam Coolers
- Camera
- Tricaine

Large Stream Rig

- Generator
- Circuit Box
- Cable
- Anode/Connectors
- Electrodes
- Float

Backpack Electrofisher

- Battery
- Electrode

Classification Based Upon Sampling: ☐ Change to SWQS Required: ☐ Yes ☐ No

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

Fish and Wildlife

Habitat Assessment - Datasheet

Low 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 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
	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 ________

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APPENDIX E

PEQUEST TROUT HATCHERY AND NATURAL RESOURCE EDUCATION CENTER — ACCESS GUIDELINES

The following procedures are intended to keep the hatchery disease free, insure the most economical production of trout and provide as much public access and freedom as possible. Division of Fish and Wildlife personnel should adhere to these procedures so that we will accomplish these goals.

I. Hatchery Personnel and Equipment

The following procedures are to be followed at all times. Any deviation must be cleared by the hatchery supervisor or person in charge.

1. No hatchery boots, gloves, shoes, nets or other fish culture equipment will be used outside the facility for any purpose (uniform clothing may be taken home to be cleaned). Distribution equipment (nets, buckets, etc.) will not be used within the hatchery. This equipment will either be kept with the distribution truck or will be disinfected and stored in an appropriate location under the control of the distribution foreman.

2. Hatchery gear such as nets, buckets, brushes and crowding racks will be disinfected after use. Gear must be disinfected before use in different raceway series. Disinfection will be accomplished by dipping or spraying the equipment with an appropriate disinfectant.

3. Any outside fish carrying trucks will not be allowed into the rearing portion of the hatchery. Water will be taken on from the paved area adjacent to Well #2. Fish will be transferred from the hatchery vehicles to the distribution trucks. Distribution trucks will be disinfected before and after distribution season.

4. Shoes will be disinfected and hands washed whenever an employee goes from the lunchroom-maintenance area to the hatchery area. Shoes or boots and hands will also be disinfected whenever the nursery or broodstock buildings are entered. Shoe covers will be provided when necessary. Disinfecting facilities will be located at the entrances to the buildings.

5. Nursery and broodstock gear will not under any circumstances be used outside of their respective areas. If gear is found outside of its use area, it will be disinfected before reuse or be declared surplus and be released for use elsewhere in the Bureau of Freshwater Fisheries.

6. The nursery building and the broodstock building are limited access areas. Hatchery personnel will attend non-hatchery persons entering these facilities and ensure that proper disinfection procedures are followed.

7. Good hatchery hygienic practices will be observed at all times when working around trout.

8. All Hackettstown hatchery personnel will be advised by the Hackettstown supervisory staff of the proper procedures prior to coming to Pequest. This should include instruction for any new employees.

9. The Pequest hatchery supervisor or person in charge will be informed of any visitation by Hackettstown hatchery personnel prior to their arrival.

10. Work boots, rubber wear, trucks, or any equipment used for the culture of fish at Hackettstown or other fish rearing facility will not be brought inside the hatchery.

11. All deviations from the above procedures will be reported at once to the hatchery supervisor or person in charge.

II. Practices Affecting Other Division Personnel

1. Vehicles other than hatchery vehicles will not be permitted within the hatchery area. Any vehicles or equipment used outside the hatchery area must be cleared by the person in charge before use in the hatchery area.

2. Shoes or boots and hands will be disinfected when going from the lunchroom-maintenance area to the hatchery.

3. Personnel other than Pequest hatchery and Wildlife Education personnel will not enter the nursery or broodstock buildings without permission of the hatchery supervisor or person in charge. Persons requiring access to these areas will undergo necessary disinfection procedures.

4. The Pequest hatchery supervisor or person in charge will be consulted prior to bringing any fish from outside sources into the hatchery area.

5. Pequest hatchery equipment will not be loaned.

6. All applicable procedures in section I will be adhered to.

III. Visitor Access

Visitor access will be controlled and coordinated by the Wildlife Education Section.

General Rules

1. Visitors will be allowed only in designated areas.

2. Special groups (i.e. educational institutions, governmental leaders, natural resource professionals, sportsmens' organizations, etc.) may be given special internal guided tours. Wildlife Education or hatchery personnel will conduct these tours and insure that all applicable sanitary procedures outlined in sections I and II are followed.

3. Visitors bringing fish from outside the hatchery will not be allowed in the hatchery area. Visitors with diseased fish will be directed to the Fish Pathology Lab.

4. Visitors wearing hip boots or waders will not be allowed on the hatchery grounds and will be requested to return them to their vehicles.

APPENDIX F

Plan for Utilization of Hatchery Surplus Trout

Excess Trout (overproduction spring fingerlings)

Over production spring fingerlings are referred to as "excess" trout that become available in the spring and are to be utilized according to the following prioritized list:

a) Recommendations by regional fisheries biologists to accomplish a specific objective (e.g. new impoundments, establishment of a reproducing population in a stream). Recommendations should be submitted to the hatchery by December 1 to ensure availability for the following spring.

b) Initiating new, but on a limited basis (as surplus numbers permit), stocking programs.

c) Sportsmen sponsored and operated fish culture nurseries (none at present).

d) Barter with other state/federal agencies

e) Large streams that support trout year round (maximum quantity given):

Musconetcong R. (from Stephens S.P. downstream)	60,000
Paulinskill – Lower	40,000
Paulinskill – Upper	3,000 (brook trout only)
Pohatcong Creek – Lower	30,000
Raritan River S/B – Middle	50,000
Toms River (bkt only)	3,000
Wanaque River – Upper	20,000

*Assumptions: year round survival possible but contribution to the creel will be insignificant; impact to the existing resource will be minimal.

f) Forage for other cultured fish species

Bonus Trout (overproduction spring catchables)

Overproduction spring catchable trout are referred to as "bonus" trout that may be available for distribution in the spring during In-season Weeks 6 & 7. These fish are to be stocked primarily in waters that support trout and provide a trout fishery year round. The following prioritized list of waters indicates the maximum quantity per water (maximum may be split between Weeks 6 & 7 unless otherwise noted):

a) Fishing Education Pond (if needed – quantity undetermined)

b) Stream sections regulated as year round or seasonal trout conservation areas:

Musconetcong River	500
Pequest River	1,500
S/Br. Raritan River	1,000
Toms River	500
Paulinskill- Upper	100 (no brown trout)

* Exception - Do not stock bonus trout in Pequannock STCA (naturally reproducing population.)

c) Large streams and lakes that support trout year round (if maximum available, split between Weeks 6 &7 for streams – stock lakes Week 6 only):

d) Small streams that support trout year round (if maximum available, split between Weeks 6 & 7):

Capoolong Creek	300 (Week 6 only, no brown trout)
Metedeconk River N/B	600
Pequest River – Upper	300
Wallkill River – Upper	500
Lockatong Creek	200 (Week 6 only)

e) Streams having closed in-season stocking dates that marginally support trout year round (preference is given to Week 6, but could be split between Weeks 6 & 7):

Ramapo River	800
Raritan River S/B – Lower	500
Rockaway River	1,000
Wallkill River – Lower	250
Wanaque River – Lower	150

f) Repeat item (c) reducing numbers proportionally for the amount of bonus trout remaining.

<u>Surplus Trout (overproduction fall subcatchables)</u>

Over production fall subcatchable trout are referred to as “surplus” trout. Although these fish are generally not of a desirable harvestable size, if stocked they may provide additional recreational opportunities immediately (catch & release) and the following spring. These trout are termed “surplus” and utilized as follows:

a) Sportsmen sponsored and operated fish culture nurseries (none at present).

b) Prior to 2005 these trout were stocked during the third week of fall stocking. Commencing in 2005 these surplus trout will be stocked prior to the traditional fall stocking period. Stream temperatures must be checked to determine if water is sufficiently cool (less than 21°C) and trout may have to be “tempered” before stocked. The number of trout specified below for each watermay be increased or decreased proportionally, depending upon availability):

Big Flatbrook – Lower	8,000
Black River	1,200
Manasquan River	1,400
Metedeconk River N/B	1,400
Metedeconk River S/B	1,200
Musconetcong River – Lower	10,000
Musconetcong River – Upper	3,000

Paulinskill River – Lower	7,000
Paulinskill River – Middle	800
Paulinskill River – Upper	1,200 (no brown trout)
Pequest River – Lower	6,000
Pequest River – Middle	1,600
Pequest River – Upper	600
Pohatcong Creek – Lower	3,600
Ramapo River	4,000
Raritan River N/B	4,600
Raritan River S/B – Lower	3,000
Raritan River S/B – Middle	9,000
Rockaway River	6,000
Toms River	2,000
Wallkill River – Lower	1,000
Wallkill River – Upper	1,000
Wanaque River – Lower	800

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Appendix G

Trout-stocked waters database and allocations for 2003.

Streams – Size Category A

Name	Flow (CFS)	Width (FT)	# Miles Stocked	Fishery Type	Closed Water (Y/N)	Trout Conservation Area length (mi)	Angler Interest	Available Parking	% Publicly Owned	Recreational Use Potential (RUP)	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Big Flat Brook - Lower	102	41	13.9	Y	Y	0.0	H	G	100	5	8540	3840	3420	3420	3420	3420	2140	2140	30340
Lamington River	130	50	1.0	S	N	0.0	M	A	0	3	470	0	190	190	190	190	0	0	1230
Maurice River	160	65	1.5	S	N	0.0	M	A	50	4	780	0	310	310	310	310	0	0	2020
Musconetcong River - Lower	217	69	18.4	Y	Y	0.0	H	A	24	4	10440	4700	4180	4180	4180	4180	2610	2610	37080
Paulins Kill - Lower	150	51	11.3	Y	Y	0.0	H	G	17	4	6410	2880	2560	2560	2560	2560	1600	1600	22730
Pequest River - Lower	150	68	9.7	Y	Y	0.0	H	G	23	4	5500	2480	2200	2200	2200	2200	1380	1380	19540
Pompton River	300	88	3.6	S	N	0.0	H	P	53	4	1870	0	750	750	750	750	0	0	4870
Ramapo River	222	71	9.8	S	Y	0.0	H	P	11	3	4630	2080	1850	1850	1850	1850	1160	1160	16430
Raritan River	398	141	2.2	S	N	0.0	H	G	91	5	1250	0	500	500	500	500	0	0	3250
Raritan River N/B	150	68	8.0	Y	Y	0.0	H	G	19	4	4540	2040	1810	1810	1810	1810	1130	1130	16080
Raritan River S/B - Lower	245	121	5.5	S	Y	0.0	H	G	0	4	2860	1290	1140	1140	1140	1140	720	720	10150
Raritan River S/B - Middle	130	89	12.9	Y	Y	2.5	H	A	60	4	7320	2650	2360	2930	2360	2360	1470	1830	23280
Rockaway River - Lower	217	61	8.3	S	Y	0.0	H	A	30	4	4320	1940	1730	1730	1730	1730	1080	1080	15340
Subtotal											58930	23900	23000	23570	23000	23000	13290	13650	202340

Streams - Size Category B

Name	Flow (CFS)	Width (FT)	# Miles Stocked	Fishery Type	Closed Water (Y/N)	Trout Conservation Area length (mi)	Angler Interest	Available Parking	% Publicly Owned	Recreational Use Potential (RUP)	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Black River	45	34	3.2	Y	Y	0.0	H	G	100	5	1600	720	640	640	640	640	400	400	5680
Cohansey River	40	20	1.0	S	N	0.0	M	A	0	3	380	0	150	150	150	150	0	0	980
D&R Canal	90	40	5.0	S	N	0.0	H	G	100	5	2310	0	920	920	920	920	0	0	5990
D&R Feeder Canal - Lower	76	40	3.2	S	N	0.0	H	G	100	5	1480	0	590	590	590	590	370	370	4580
D&R Feeder Canal - Upper	76	40	7.4	S	N	0.0	M	P	100	4	3130	0	1250	1250	1250	1250	780	780	9690
Manasquan River	46	35	6.9	Y	Y	0.0	H	A	73	4	3190	1430	1270	1270	1270	1270	800	800	11300
Metedeconk River S/B	45	19	2.8	S	Y	0.0	H	G	29	4	1190	530	470	470	470	470	300	300	4200
Musconetcong River - Upper	94	46	6.2	Y	Y	0.0	H	A	8	4	2860	1290	1150	1150	1150	1150	720	720	10190
Passaic River	57	58	3.6	S	N	0.0	H	A	9	4	1520	0	610	610	610	610	0	0	3960
Paulins Kill - Middle	50	39	1.8	S	Y	0.0	H	A	0	4	760	340	310	310	310	310	190	190	2720
Pequannock River	78	39	5.3	Y	N	0.0	M	P	0	2	2040	0	820	820	820	820	510	510	6340
Pequest River - Middle	55	30	4.0	S	Y	0.0	H	A	0	4	1690	760	680	680	680	680	420	420	6010
Pohatcong Creek - Lower	48	35	7.4	Y	Y	0.0	H	P	0	3	3130	1410	1250	1250	1250	1250	780	780	11100
Rancocas Creek SW/B	52	34	1.0	S	N	0.0	M	A	100	4	420	0	170	170	170	170	0	0	1100
Raritan River S/B - Upper	42	46	5.6	Y	Y	0.0	H	G	30	4	2590	1160	1040	1040	1040	1040	650	650	9210
Rockaway River - Upper	93	32	4.4	S	Y	0.0	H	G	90	5	2030	920	810	810	810	810	510	510	7210
Toms River	45	24	3.5	Y	Y	1.0	H	G	70	5	1750	560	500	700	500	500	310	440	5260
Wallkill River - Lower	63	26	2.4	S	Y	0.0	H	A	8	4	1020	460	410	410	410	410	250	250	3620
Wanaque River - Lower	78	44	2.5	S	Y	0.0	M	P	1	3	960	430	380	380	380	380	240	240	3390
Wanaque River - Upper	78	44	2.3	Y	Y	0.0	H	A	100	4	1060	480	420	420	420	420	270	270	3760
Subtotal											35110	10490	13840	14040	13840	13840	7500	7630	116290

Streams - Size Category C

Name	Flow (CFS)	Width (FT)	# Miles Stocked	Fishery Type	Closed Water (Y/N)	Trout Conservation Area length (mi)	Angler Interest	Available Parking	% Publicly Owned	Recreational Use Potential (RUP)	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Assunpink Creek	36	31	2.1	S	N	0.0	H	P	10	3	530	0	210	210	210	210	0	0	1370
Beaver Brook (Warren)	24	29	2.7	S	N	0.0	M	A	18	3	680	0	270	270	270	270	0	0	1760
Big Flat Brook - Upper	21	26	2.5	S	N	0.0	M	A	100	4	700	0	280	280	280	280	0	0	1820
Hackensack River	26	54	2.7	S	N	0.0	L	A	22	3	680	0	270	270	270	270	0	0	1760
Hohokus Brook	22	25	1.5	S	N	0.0	L	P	20	2	340	0	140	140	140	140	0	0	900
Lawrence Brook	27	41	1.0	S	N	0.0	H	A	50	4	280	0	110	110	110	110	0	0	720
Little Flat Brook	20	16	3.7	Y	N	0.0	H	A	65	4	1120	0	450	450	450	450	280	0	3200
Lubbers Run	30	21	1.8	Y	N	0.0	M	G	9	4	550	0	220	220	220	220	140	0	1570
Metedeconk River N/B	37	23	4.4	Y	Y	0.0	H	A	0	4	1340	600	540	540	540	540	330	330	4760
Pascack Creek	23	31	2.4	S	N	0.0	L	A	15	3	610	0	240	240	240	240	0	0	1570
Paulins Kill - Upper	38	23	4.4	Y	Y	1.5	H	A	34	4	1340	400	350	540	350	350	220	330	3880
Pequest River - Upper	38	15	2.1	Y	Y	0.0	H	A	0	4	640	290	260	260	260	260	160	160	2290
Rahway River	29	32	8.5	S	N	0.0	H	A	100	4	2370	0	950	950	950	950	0	0	6170
Rockaway Creek	22	29	0.8	S	N	0.0	H	P	75	4	220	0	100	100	100	100	0	0	620
Saddle River - Lower	31	31	5.1	S	N	0.0	M	P	40	3	1290	0	520	520	520	520	0	0	3370
Saddle River - Upper	31	31	1.5	Y	N	0.0	M	P	0	2	380	0	150	150	150	150	100	0	1080
Stony Brook	22	41	6.0	S	N	0.0	H	A	8	4	1670	0	670	670	670	670	0	0	4350
Wallkill River - Upper	38	20	3.5	Y	Y	0.0	H	A	7	4	1060	480	430	430	430	430	270	270	3800
Wawayanda Creek	30	30	1.5	Y	N		M	G	100	4	460	0	0	0	0	0	0	0	460
Subtotal											16260	1770	6160	6350	6160	6160	1500	1090	45450

Streams - Size Category D

Name	Flow (CFS)	Width (FT)	# Miles Stocked	Fishery Type	Closed Water (Y/N)	Trout Conservation Area length (mi)	Angler Interest	Available Parking	% Publicly Owned	Recreational Use Potential (RUP)	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Beaver Brook (Hunterdon)	12	21	1.6	Y	N	0.0	L	P	35	2	330	0	130	0	130	0	0	0	590
Beaver Brook (Morris)	15	25	1.5	S	N	0.0	H	A	0	4	340	0	130	130	130	0	0	0	730
Blair Creek	12	26	2.1	Y	N	0.0	L	A	0	2	430	0	170	0	170	0	0	0	770
Capoolong Creek	11	20	4.5	Y	N	0.0	H	G	88	5	1200	0	480	480	480	480	300	0	3420
Clove Brook	16	19	2.6	Y	N	0.0	M	A	0	3	590	0	230	230	230	230	150	0	1660
Culvers Lake Brook	10	17	1.5	Y	N	0.0	M	A	10	3	340	0	130	130	130	130	100	0	960
Drakes Brook	9	16	1.0	S	N	0.0	M	A	0	3	200	0	100	100	100	0	0	0	500
Dry Brook	8	18	0.8	S	N	0.0	L	G	0	3	160	0	100	100	100	0	0	0	460
Franklin Pond Creek	8	12	1.8	Y	N	0.0	M	P	75	4	440	0	180	180	180	180	110	0	1270
Hibernia Brook	10	16	2.0	Y	N	0.0	H	A	35	4	490	0	200	200	200	200	120	0	1410
Hockhocksen Brook	8	13	0.8	Y	N	0.0	H	P	0	3	180	0	100	100	100	100	100	0	680
India Brook	10	25	1.5	Y	N	0.0	H	G	87	5	400	0	160	160	160	160	100	0	1140
Lockatong Creek	8	18	4.0	Y	N	0.0	H	P	0	3	900	0	360	360	360	360	230	0	2570
Lopatcong Creek	10	19	4.9	Y	N	0.0	H	A	0	4	1200	0	480	480	480	480	300	0	3420
Mingamahone Brook	13	19	1.2	Y	N	0.0	L	G	100	4	290	0	120	120	120	120	100	0	870
Mulhockaway Creek	14	15	1.5	Y	N	0.0	M	A	33	4	370	0	150	150	150	150	100	0	1070
Neshanic River	12	25	1.5	S	N	0.0	L	P	0	2	280	0	110	0	110	0	0	0	500
Papakating Creek	16	11	3.4	Y	N	0.0	M	P	0	2	700	0	280	0	280	0	0	0	1260
Peapack Brook	10	27	2.0	Y	N	0.0	H	A	0	4	490	0	200	200	200	200	120	0	1410
Pohatcong Creek - Upper	10	12	2.0	Y	N	0.0	M	P	0	2	410	0	160	0	160	0	0	0	730
Pond Brook	15	20	0.5	Y	N	0.0	H	P	0	3	110	0	100	100	100	100	100	0	610
Ringwood Brook	17	23	1.0	Y	N	0.0	M	G	100	4	250	0	100	100	100	100	100	0	750
Rockaway Creek S/B	10	23	1.0	Y	N	0.0	M	A	0	3	230	0	100	100	100	100	100	0	730
Shark River	14	15	2.6	Y	N	0.0	M	G	73	4	640	0	260	260	260	260	160	0	1840
Spruce Run Creek	11	24	6.0	Y	N	0.0	H	A	0	4	1470	0	590	590	590	590	370	0	4200
Tienekill Creek	8	21	1.5	S	N	0.0	L	A	73	3	310	0	120	120	120	0	0	0	670
Trout Brook (Hope)	8	18	1.5	Y	N	0.0	L	P	0	1	280	0	110	0	110	0	0	0	500
Subtotal											13030	0	5350	4390	5350	3940	2660	0	34720

Streams - Size Category E

Name	Flow (CFS)	Width (FT)	# Miles Stocked	Fishery Type	Closed Water (Y/N)	Trout Conservation Area length (mi)	Angler Interest	Available Parking	% Publicly Owned	Recreational Use Potential (RUP)	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Andover Jct Brook	5	12	1.1	Y	N	0.0	M	A	0	3	160	0	160	0	160	0	0	0	480
Biers Kill	5	9	1.2	Y	N	0.0	M	P	0	2	160	0	160	0	160	0	0	0	480
Buckhorn Creek	4	8	2.0	Y	N	0.0	M	A	0	3	290	0	290	0	290	0	0	0	870
Furnace Brook	4	12	1.2	Y	N	0.0	H	G	0	4	190	0	190	0	190	0	0	0	570
Glenwood Brook	5	7	1.0	Y	N	0.0	L	P	0	2	130	0	130	0	130	0	0	0	390
Green Brook	6	18	1.0	S	N	0.0	M	A	100	4	140	0	140	140	0	0	0	0	420
Hakihohake Creek	7	24	4.3	Y	N	0.0	M	A	10	3	620	0	620	0	620	0	0	0	1860
Honey Run	5	11	2.2	Y	N	0.0	L	P	0	2	290	0	290	0	290	0	0	0	870
Ireland Brook	5	15	0.5	S	N	0.0	M	A	100	4	100	0	100	100	0	0	0	0	300
Jacksonburg Creek	6	22	1.5	Y	N	0.0	M	A	0	3	220	0	220	0	220	0	0	0	660
Middle Brook	6	12	1.0	Y	N	0.0	M	A	0	3	140	0	140	0	140	0	0	0	420
Mill Brook	5	16	1.5	Y	N	0.0	M	A	0	3	220	0	220	0	220	0	0	0	660
Neldon Brook	5	7	1.3	Y	N	0.0	L	A	20	3	190	0	190	0	190	0	0	0	570
Nishisakawick Creek	6	25	3.5	S	N	0.0	L	A	0	2	410	0	410	410	0	0	0	0	1230
Papakating Creek W/B	6	12	2.0	S	N	0.0	L	P	0	2	240	0	240	240	0	0	0	0	720
Pophandusing Creek	6	18	1.5	Y	N	0.0	M	A	0	3	220	0	220	0	220	0	0	0	660
Roaring Rock Brook	5	11	2.2	Y	N	0.0	H	A	0	4	350	0	350	0	350	0	0	0	1050
Russia Brook	0	0	0.5	Y	N	0.0	L	P	0	2	100	0	100	0	100	0	0	0	300
Shimers Brook	6	13	1.0	Y	N	0.0	L	P	0	2	130	0	130	0	130	0	0	0	390
Spring Mills Brook	5	12	1.5	Y	N	0.0	M	A	0	3	220	0	220	0	220	0	0	0	660
Trout Brook (Hacketts.)	4	14	1.3	Y	N	0.0	H	P	0	3	190	0	190	0	190	0	0	0	570
Trout Brook (Middleville)	7	8	1.0	Y	N	0.0	M	P	100	4	160	0	160	0	160	0	0	0	480
Tuttles Corner Brook	6	13	1.6	Y	N	0.0	M	G	100	4	250	0	250	0	250	0	0	0	750
Whippany River - Lower	5	21	3.3	S	N	0.0	M	A	87	4	480	0	480	480	0	0	0	0	1440
Whippany River - Upper	5	21	1.1	Y	N	0.0	M	A	81	4	170	0	170	0	170	0	0	0	510
Wichecheoke Creek	6	28	2.4	S	N	0.0	M	P	0	2	280	0	280	280	0	0	0	0	840
Yellow Brook	6	18	1.0	S	N	0.0	M	P	0	2	120	0	120	120	0	0	0	0	360
Subtotal											6170	0	6170	1770	4400	0	0	0	18510

Streams - Size Category F

Name	Flow (CFS)	Width (FT)	# Miles Stocked	Fishery Type	Closed Water (Y/N)	Trout Conservation Area length (mi)	Angler Interest	Available Parking	% Publicly Owned	Recreational Use Potential (RUP)	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Barkers Mill Brook	2	8	1.0	Y	N	0.0	L	A	0	2	130	0	0	130	0	0	0	0	260
Rock Brook	3	21	2.5	S	N	0.0	H	A	0	4	360	0	0	360	0	0	0	0	720
Roy Spring Brook	3	6	1.2	Y	N	0.0	M	P	0	2	160	0	0	160	0	0	0	0	320
Sydney Brook	1	15	1.0	S	N	0.0	L	A	0	2	120	0	0	120	0	0	0	0	240
Subtotal											770	0	0	770	0	0	0	0	1540

Ponds and Lakes – 1 to 5 acres (put-and-take)

Name	# Surface Acres	Fishery Type	# Trout Stocked Waters (within 10 mi)	Population Density (# people/ sq mi)	Boating &/Or Shoreline Restricted	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Alms House Pond	2	S	23	150		140	0	100	100	100	0	0	0	440
Blair Lake	2	S	14	141		140	0	100	100	100	0	0	0	440
Burnham Park Pond	4	S	6	5809		330	0	250	250	250	250	0	0	1330
Diamond Mill Pond	4	S	3	1954		330	0	250	250	250	0	0	0	1080
Garvey's Pond	2	S	1	1523		170	0	120	120	120	0	0	0	530
Holmdel Park Pond	3	S	2	472		230	0	170	170	170	0	0	0	740
Lake Papaianni [1]	5	S	3	2939		420	0	0	0	0	0	0	0	420
Laurel Pond	3	S	2	1388		250	0	190	190	190	0	0	0	820
Mac's Pond [1]	2	S	6	3879		150	0	0	0	0	0	0	0	150
Mohawk Pond	2	S	4	6875		180	0	140	140	140	140	0	0	740
Riverview Beach Pond	5	S	0	597		450	0	340	340	340	340	0	0	1810
Rowands Pond	3	S	3	2960		250	0	190	190	190	0	0	0	820
Schadler's Sand Wash Pond	5	S	1	469		380	0	290	290	290	0	0	0	1250
Seeley's Pond	3	S	4	1931		250	0	190	190	190	0	0	0	820
West Hudson County Park Pond [1]	4	S	6	10972		330	0	0	0	0	0	0	0	330
West Pond	3	S	0	11373		310	0	230	230	230	230	0	0	1230
Westville Pond [1]	2	S	3	4748		170	0	0	0	0	0	0	0	170
Subtotal						4480	0	2560	2560	2560	960	0	0	13120

[1] Designated as stocked during pre-season only.

Ponds and Lakes – 6 to 30 acres (put-and-take)

Name	# Surface Acres	Fishery Type	# Trout Stocked Waters (within 10 mi)	Population Density (# people/ sq mi)	Boating &/Or Shoreline Restricted	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Amwell Lake	10	S	3	123		410	0	310	310	310	0	0	0	1340
Barbour's Pond	12	S	12	3828		420	0	310	310	310	0	0	0	1350
Birch Grove Park Pond	12	S	0	2227	B	460	0	340	340	340	340	0	0	1820
Blue Mountain Lake	14	S	5	99	B	350	0	260	260	260	0	0	0	1130
Branch Brook Park Pond	24	S	4	13639		570	0	420	420	420	420	0	0	2250
Clarks Pond [1]	7	S	6	8470		430	0	0	0	0	0	0	0	430
Colonial Lake	10	S	5	902		410	0	310	310	310	0	0	0	1340
Crystal Lake	20	S	3	5252		540	0	410	410	410	410	0	0	2180
Englishtown Mill Pond	6	S	1	1712		420	0	320	320	320	0	0	0	1380
Giampietro Park Pond	11	S	1	773		410	0	310	310	310	0	0	0	1340
Greenwich Lake	20	S	3	573		460	0	340	340	340	0	0	0	1480
Grenloch Lake	8	S	3	8		400	0	300	300	300	0	0	0	1300
Haddon Lake [1]	10	S	2	6178		480	0	0	0	0	0	0	0	480
Harrisonville Lake	30	S	3	95		510	0	380	380	380	0	0	0	1650
Hook's Creek Lake	10	S	0	1345		520	0	390	390	390	390	0	0	2080
Indian Lake	6	S	4	6266		460	0	340	340	340	340	0	0	1820
Lake Ocquittunk	8	S	13	35		360	0	270	270	270	0	0	0	1170
Lower Echo Park Pond	6	S	4	1736		420	0	320	320	320	0	0	0	1380
Mary Elmer Lake	18	S	3	2892		490	0	370	370	370	0	0	0	1600
Mill Pond	9	S	7	3300		400	0	300	300	300	0	0	0	1300
Milton Lake	10	S	4	6681		480	0	360	360	360	360	0	0	1920

[1] Designated as stocked during pre-season only.

Ponds and Lakes – 6 to 30 acres (put-and-take) (continued)

Name	# Surface Acres	Fishery Type	# Trout Stocked Waters (within 10 mi)	Population Density (# people/ sq mi)	Boating &/Or Shoreline Restricted	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Mt. Hope Pond	18	S	9	469		410	0	310	310	310	0	0	0	1340
Mullica Hill Pond	10	S	5	188		410	0	310	310	310	0	0	0	1340
Oak Pond	12	S	0	522		490	0	370	370	370	370	0	0	1970
Oldham Pond	15	S	9	2336		430	0	320	320	320	0	0	0	1390
Roosevelt Park Pond	10	S	1	2290		440	0	330	330	330	0	0	0	1430
Rosedale Lake	30	S	4	188		510	0	380	380	380	0	0	0	1650
Saw Mill Lake	20	S	12	46		420	0	310	310	310	0	0	0	1350
Shaws Mill Pond	30	S	2	33		510	0	380	380	380	0	0	0	1650
Silver Lake [1]	21	S	15	164		420	0	0	0	0	0	0	0	420
Speedwell Lake	23	S	7	5809		520	0	390	390	390	390	0	0	2080
Spooky Brook Park Pond [1]	8	S	2	914		400	0	0	0	0	0	0	0	400
Spring Lake	16	S	3	3099		480	0	360	360	360	0	0	0	1560
Stony Lake	15	S	18	36	B	310	0	240	240	240	0	0	0	1030
Swedesboro Lake	20	S	4	2638		500	0	380	380	380	0	0	0	1640
Sylvan Lake	12	S	1	812		420	0	310	310	310	0	0	0	1350
Takanassee Lake	14	S	3	5847		510	0	380	380	380	380	0	0	2030
Topenemus Lake	21	S	3	519		460	0	350	350	350	0	0	0	1510
Verona Park Lake	13	S	4	5059		500	0	380	380	380	380	0	0	2020
Warinanco Park Pond [1]	8	S	4	7692		470	0	0	0	0	0	0	0	470
Whites Pond	6	S	11	5269		420	0	320	320	320	320	0	0	1700
Woodcliff Lake	15	S	1	8707		510	0	380	380	380	380	0	0	2030
Subtotal						18940	0	12560	12560	12560	4480	0	0	61100

[1] Designated as stocked during pre-season only.

Ponds and Lakes – over 30 acres (put-and-take)

Name	# Surface Acres	Fishery Type	# Trout Stocked Waters (within 10 mi)	Population Density (# people/ sq mi)	Boating &/Or Shoreline Restricted	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Bostwick Lake	32	S	3	144		0	0	0	0	0	0	0	0	0
Canistear Reservoir	350	S	12	242		760	0	570	570	570	0	0	0	2470
Columbia Lake	55	S	11	100		490	0	360	360	360	0	0	0	1570
Cranberry Lake	179	S	14	364	B&S	360	0	270	270	270	0	0	0	1170
Dennisville Lake	50	S	1	60	S	430	0	330	330	330	0	0	0	1420
Farrington Lake	290	S	2	1752		840	0	630	630	630	0	0	0	2730
Furnace Lake	53	S	16	2910		530	0	400	400	400	0	0	0	1730
Hammonton Lake	75	S	0	294		660	0	490	490	490	490	0	0	2620
Iona Lake	36	S	2	220	S	420	0	320	320	320	0	0	0	1380
Lake Musconetcong	329	S	15	1084	S	670	0	500	500	500	0	0	0	2170
Lake Shenandoah	46	S	5	1576		570	0	430	430	430	0	0	0	1860
Little Swartswood Lake	75	S	17	157	S	400	0	300	300	300	0	0	0	1300
Manasquan Reservoir	770	S	11	62		1150	0	860	860	860	0	0	0	3730
Mountain Lake	122	S	19	141	S	440	0	330	330	330	0	0	0	1430
Pohatcong Lake	33	S	0	834		610	0	450	450	450	450	0	0	2410
Pompton Lake	204	S	13	1908	B&S	440	0	330	330	330	0	0	0	1430
Prospertown Lake	80	S	3	256	B&S	360	0	270	270	270	0	0	0	1170
Shadow Lake	88	S	2	1659		620	0	460	460	460	0	0	0	2000
Spruce Run Reservoir	1290	S	12	235		1630	0	1220	1220	1220	0	0	0	5290
Subtotal						11380	0	8520	8520	8520	940	0	0	37880

[1] Designated as stocked during pre-season only.

Ponds and Lakes (put-grow-and-take)

Name	# Surface Acres	Fishery Type	# Trout Stocked Waters (within 10 mi)	Population Density (# people/ sq mi)	Boating &/Or Shoreline Restricted	Pre-season	In-season Week 1	In-season Week 2	In-season Week 3	In-season Week 4	In-season Week 5	In-season Week 6	In-season Week 7	Total
Clinton Reservoir	423	Y	8	291		910	0	910	0	910	0	910	0	3640
Lake Aeroflex	103	Y	7	270		580	0	580	0	580	0	580	0	2320
Lake Hopatcong	2685	Y	22	727	S	2630	0	2630	0	2630	0	2630	0	10520
Merrill Creek Reservoir	650	Y	6	108		0	0	0	4560	0	0	0	0	4560
Monksville Reservoir	505	Y	6	291		990	0	990	0	990	0	990	0	3960
Round Valley Reservoir	2350	Y	12	244		0	0	2850	0	2850	0	2850	0	8550
Scarlet Oak Pond [1]	22	Y	12	690	B	380	0	0	0	0	0	0	0	380
Sheppard's Lake	74	Y	6	459		550	0	550	0	550	0	550	0	2200
Swartswood Lake	494	Y	17	142		980	0	980	0	980	0	980	0	3920
Wawayanda Lake	255	Y	11	242		740	0	740	0	740	0	740	0	2960
White Lake	65	Y	15	0		0	0	0	0	1090	0	0	0	1090
Subtotal						7760	0	10230	4560	11320	0	10230	0	44100

[1] Designated as stocked during pre-season only.

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APPENDIX H

New Jersey Division of Fish and Wildlife
List of Trout-Stocked Waters - 2005

General Explanation

The New Jersey Division of Fish and Wildlife (NJDFW) annually stocks trout in waters throughout the state. Trout-stocked waters are designated in the Fish Code (N.J.A.C. 23:25-6) which is adopted each year by the New Jersey Fish and Game Council, pursuant to the authority of N.J.S.A. 13:1B-29 et seq. and N.J.S.A. 23:1-1 et seq. The list of trout-stocked waters may change slightly from year to year in reponse to program changes. A copy of the Fish Code may be obtained from the NJDFW and is also available in summary form in the of the Fish & Wildlife Digest (freshwater fishing edition) that is available wherever fishing licenses are sold (i.e. sporting goods stores, etc).

In the Fish Code, designated trout-stocked waters are listed by county. Individual names (and occasionally the spelling) of trout-stocked waters may follow local tradition. These names may not appear as such on U.S.G.S. quadrangles, county or state maps, etc. and further, may not be identified in the Surface Water Classification Tables (promulgated under N.J.A.C. 7:9B-1.15). This has made it difficult for regulators, consultants, and others to determine if a water is trout-stocked and in need of further consideration in accordance with New Jersey Department of Environmental Protection regulations. The list below was developed as a companion to another NJDFW document entitled “Classification of N.J. Trout Waters as Related to Their Suitability for Trout“. In both of these documents, the listed waters are organized by watershed (rather than by county) and for consistency the nomenclature found the Surface Water Classification Tables is used.

The season(s) during which trout are stocked is indicated by the following letter(s) which precede a listed water.

S Spring – Stocking occurs over a ten week period, generally beginning in mid-March and continuing through May.

F Fall – Stocking occurs over a two week period, generally commencing the second week in October.

W Winter – Stocking occurs during the three days immediately preceding Thanksgiving Day.

List of NJ Trout-Stocked Waters for 2005

Alloway Creek Drainage

None

Assiscunk Creek Drainage

None

Assunpink Creek Drainage

S	Assunpink Creek (Lawrence/Hamilton Twps.)	Assunpink Site 5 dam upstream of Rt. 130 bridge to Carnegie Rd., Hamilton Twp.
S/F	Colonial Lake (Lawrence Twp.)	Entire waterbody

Atlantic Ocean (Atlantic Co.) Drainage

None

Atlantic Ocean (Cape May Co.) Drainage

S	West Pond (Cape May Court House)	Entire waterbody

Atlantic Ocean (Monmouth Co.) Drainage

S/W	Spring Lake (Spring Lake)	Entire waterbody
S	Takanassee Lake (Long Branch)	Entire waterbody

Arthur Kill (Middlesex Co.) Drainage

None

Delaware Bay (Cumberland Co.) Drainage

None

Arthur Kill (Union Co.) Drainage

None

Barnegat Bay (Ocean Co.) Drainage

None

Big Timber Creek Drainage

S/F	Grenloch Lake (Turnersville)	Entire waterbody
S/W	Rowands Pond (Clementon)	Entire waterbody
S	Westville Lake (Westville)	Entire waterbody

Blacks Creek Drainage

None

Cedar Creek Drainage

None

Cohansey Creek Drainage

S	Bostwick Lake (Friesburg)	Entire waterbody
S	Cohansey River (Bridgeton)	Dam at Seeleys Pond to powerline above Sunset Lake, Bridgeton
S/F	Mary Elmer Lake (Bridgeton)	Entire waterbody

Cooper Creek Drainage

None

Crosswicks Creek Drainage

S	Prospertown Lake (Prospertown)	Entire waterbody

Delaware Bay (Cape May Co.) Drainage

S	Dennisville Lake (Dennisville)	Entire waterbody
S/W	Shaws Mill Pond (Newport)	Entire waterbody

Delaware and Raritan Canal (Mainstem and Feeder)

S	Delaware – Raritan Canal (Hunterdon/Mercer Counties)	Feeder Canal (Lambertville) - Bulls Island to Upper Ferry Road bridge
S	Delaware – Raritan Canal Mainstem (Trenton)	Mulberry Street, Trenton to Alexander Street, Princeton

Delaware River (Burlington Co.) Drainage

S/F	Crystal Lake (Willingboro)	Entire waterbody
S/F	Sylvan Lake (Burlington)	Entire waterbody

Delaware River (Camden Co.) Drainage

S	Haddon Lake (Audubon)	Entire waterbody

Delaware River (Gloucester Co.) Drainage

S/F	Greenwich Lake (Gibbstown)	Entire waterbody

Delaware River (Hunterdon Co.) Drainage

	Everittstown Brook - see Nishisakawick Creek	
	Frenchtown Brook - see Nishisakawick Creek	
S	Hakihokake Creek (Milford) (a.k.a. Milford Brook)	Entire length
S	Hakihokake Creek (trib.)(Wydner)	Entire length (stocked as part of Hakihokake Ck.)
S	Lockatong Creek (Kingwood/Raven Rock)	Entire length
S	Nishisakawick Creek (Frenchtown) (a.k.a. Everittstown Brook/ Frenchtown Brook)	Entire length
S	Spring Mills Brook (Spring Mills/Milford)	Entire length
S	Wickecheoke Creek (Stockton)	Covered Bridge (Rt. 604), Sergentsville, to Delaware River

Delaware River (Mercer Co.) Drainage

None

Delaware River (Salem Co.) Drainage

S/W	Riverview Beach Pond (Pennsville)	Entire waterbody

Delaware River (Sussex Co.) Drainage

S	Shimers Brook (High Point/Millville)	Entire length
S	Blue Mountain Lake (Delaware Water Gap NRA)	Entire waterbody

Delaware River (Warren Co.) Drainage

S	Buckhorn Creek (Hutchinson)	Entire length
S	Lopatcong Creek (Herkers Hollow/Phillipsburg)	Rt. 519 bridge to South Main Street, Phillipsburg
S	Pophandusing Creek (Hazen/Belvidere)	Oxford Road, Hazen to Delaware River

Elizabeth River Drainage

None

Flat Brook Drainage

S	Beerskill (Shaytown)	Entire length
	Bierskill – see Beerskill	
S	Big Flat Brook (Montague & Sandyston Twps)	Entire length (Saw Mill Pond to confluence with Flat Brook) – see also Flat Brook
S/F	Flat Brook (Flatbrook-Roy/Flatbrookville)	Entire length - see also Big Flat Brook Walpack)
S/W	Lake Ocquittunk (Stokes S.F.)	Entire waterbody
S	Little Flat Brook (High Point S.P./Layton)	Entire length
S	Sawmill Pond (High Point) (a.k.a. Saw Mill Lake)	Entire waterbody
S	Stony Lake (Stokes S.F.)	Entire waterbody
S	Tuttles Corner Brook (Tuttles Corner)	Entire length

Forked River Drainage

None

Great Egg Harbor River Drainage

S/W	Birch Grove Park Pond (Northfield)	Entire waterbody
S/F	Oak Pond (Sicklerville)	Entire waterbody
S/F	Pohatcong Lake (Tuckerton)	Entire waterbody

Hackensack River Drainage

S	Hackensack River (Old Tappan)	Lake Tappan to Harriot Ave., Harrington Park
S/W	Mill Pond (Park Ridge)	Entire waterbody
S	Pascack Creek (Hillsdale)	Orchard Street, Hillsdale to Lake Street, Westwood
S	Tenakill Brook (Demarest)	Entire length
	Tienakill Creek – see Tenakill Brook	

Hudson River Drainage

S/W	Woodcliff Lake (North Bergen)	Entire waterbody (J.J. Braddock Park)

Little Egg Harbor (Manahawkin Bay) Drainage

None

Manasquan River Drainage

S	Mac's Pond (Manasquan)	Entire waterbody
S	Manasquan Reservoir (Howell Twp.)	Entire waterbody
S/F	Manasquan River (Farmingdale)	Rt. 9 bridge downstream to Bennetts Bridge, Manasquan WMA
S	Mingamahone Brook (Farmingdale/Allaire S.P.)	Hurley Pond Road to Manasquan River

Mantua Creek Drainage

None

Maurice River Drainage

S/F	Iona Lake (Iona)	Entire waterbody
S/F	Giampetro Park Lake (Vineland)	Entire waterbody
S/F	Maurice River (Vineland)	Willow Grove Lake dam downstream to Sherman Avenue bridge, Vineland

Metedeconk River Drainage

S/F	Metedeconk River (N/Br.)(Lakewood)	Aldrich Road bridge downstream to Ridge Ave.
S/F	Metedeconk River (S/Br.)(Lakewood)	Bennetts Mill dam to twin wooden foot bridge, opposite Lake Park Blvd. on South Lake Drive, Lakewood
S/W	Lake Shenandoah (Lakewood)	Entire waterbody

Morses Creek Drainage

None

Mullica River Drainage

S/F	Hammonton Lake (Hammonton)	Entire waterbody

Musconetcong River Drainage

S	Cranberry Lake (Byram)	Entire waterbody
	Hatchery Brook – see Trout Brook	
S	Lake Hopatcong (Hopatcong)	Entire waterbody
S	Lake Musconetcong (Netcong)	Entire waterbody
S	Lubbers Run (Byram)	Entire length
S/F	Musconetcong River (Hackettstown)	Lake Hopatcong dam downstream to Delaware River, including all mainstem impoundments except Lake Musconetcong
S	Trout Brook (Hackettstown)	Entire length (including Hatchery Brook)

Navesink River Drainage

S	Garvey's Pond (Navesink)	Entire waterbody
S	Hockhocksen Brook (Colts Neck Twp.)	Hockhocksen Road to Garden State Parkway (northbound)
S	Holmdel Park Pond (Holmdel)	Entire waterbody
S	Mohawk Pond (Red Bank)	Entire waterbody
S	Shadow Lake (Red Bank)	Entire waterbody
S	Yellow Brook (Colts Neck)	Heyers Mill Road to Muhlenbrink Road

Newark Bay (Essex Co.) Drainage

None

Newark Bay (Hudson Co.) Drainage

None

Newark Bay (Union Co.) Drainage

None

Oldmans Creek Drainage

S	Harrisonville Lake (Harrisonville)	Entire waterbody

Oyster Creek Drainage

None

Passaic River Drainage

S/W	Barbour's Pond (West Paterson)	Entire waterbody
S	Beaver Brook (Rockaway Twp.)	Entire length
S	Branch Brook Park Lake (Newark)	Entire waterbody
S	Burnham Park Pond (Morristown)	Entire waterbody
S	Canistear Reservoir (Vernon)	Entire waterbody
S	Clarks Pond (Bloomfield)	Entire waterbody
S	Clinton Reservoir (W. Milford)	Entire waterbody
S/W	Green Turtle Pond (Wamaque Wildlife Mgmt. Area)	Entire waterbody
S	Hibernia Brook (Hibernia)	Entire length
S	Hohokus Brook (Hohokus)	Forest Road to Whites Pond
S	Indian Lake (Little Ferry)	Entire waterbody
S/W	Mt. Hope Pond (Mt. Hope)	Entire waterbody
S	Oldham Pond (North Haledon)	Entire waterbody
S	Passaic River (Millington)	White Bridge Road to Dead River
S	Pequannock River (Kinnelon/Butler/Riverdale)	Rt. 23, Smoke Rise to Paterson- Hamburg Turnpike in Pompton Lakes
S	Pompton Lake (Pompton Lakes)	Entire waterbody
S	Pompton River (Wayne)	Pompton Lake to Newark-Pompton Turnpike
S/F	Ramapo River (Mahwah/Oakland)	State line downstream to Pompton Lake
S	Ringwood Creek (Ringwood/Sloatsburg) (a.k.a. Ringwood Brook)	State line to Sallys Pond, Ringwood S.P.
S/F	Rockaway River (Jefferson Twp./Boonton)	Longwood Lake dam (Jefferson Twp.) to Jersey City Reservoir in Boonton

S	Russia Brook (Milton)	Ridge Road to Lake Swannanoa
S	Saddle River (Saddle River)	State line downstream to Dunkerhook Road, Fairlawn
S	Scarlet Oak Pond (Mahwah)	Entire waterbody
S	Sheppard Lake (Ringwood State Park) (a.k.a. Shepherd Lake)	Entire waterbody
S/W	Speedwell Lake (Morristown)	Entire waterbody
S/W	Verona Park Lake (Verona)	Entire waterbody
S/F	Wanaque River (West Milford/Pompton Lakes)	Greenwood Lake dam to jct. with Pequannock River, excluding Wanaque Reservoir, Monksville Reservoir and Lake Inez
S	Whippany River (Brookside/Morristown)	Tingley Road, Morris Twp. to Ridgedale Avenue, Morristown
S	Whites Pond (Waldwick)	Entire waterbody
S	West Hudson County Park Pond (Harrison)	Entire waterbody

Paulins Kill Drainage

S	Alms House Pond (Hampton Twp.) (a.k.a. County Farm Pond)	Entire waterbody
S	Blair Creek (Hardwick Center)	Hardwick Center to Blair Lake
S	Blair Lake (Blairstown)	Entire waterbody
S	Columbia Lake (Columbia)	Lake and gatehole
S	Culver's Creek (Frankford) (a.k.a Culvers Lake Brook)	Entire length
	Culvers Lake Brook – see Culver's Creek	
S	Dry Brook (Branchville)	Entire length
S	Jacksonburg Creek (Blairstown)	Entire length
S/W	Little Swartswood Lake (Swartswood)	Entire waterbody
	Neldon Brook – see Swartswood Creek	
S/F	Paulins Kill (Blairstown)	Entire length (confluence of East and West branches downstream to Columbia Lake)
S/F	Paulins Kill (E/Br.)(Andover/Lafayette Twp.)	Limecrest RR spur downstream to confluence with Paulins Kill, W/Br.
S/F	Paulins Kill (W/Br.)(Newton)	Warbasse Jct. Road bridge (Rt. 663) to confluence with Paulins Kill, E/Br.
S	Paulins Kill (trib.)(Stillwater Sta.) (a.k.a. Roy Spring Brook)	Entire length
S	Pond Brook (Middleville)	Entire length
	Roy Spring Brook – see Paulins Kill (trib.) (Stillwater Sta.)	
S	Swartswood Creek (Swartswood) (a.k.a. Neldon Brook)	Entire length
S	Swartswood Lake (Swartswood)	Entire waterbody
S	Trout Brook (Middleville)	Entire length
S	White Lake (Hardwick Twp.)	Entire waterbody

Pennsauken Creek Drainage

S/W	Laurel Pond (Mt. Laurel)	Entire waterbody

Pequest River Drainage

S	Andover Junction Brook (Andover)	Entire length

S	Barkers Mill Brook (Independence)	Entire length
S	Beaver Brook (Hope)	Silver Lake dam to Pequest River
	Brookaloo Swamp (Hope) – see Honey Run	Entire length
S	Furnace Brook (Oxford)	Entire length
S/W	Furnace Lake (Oxford)	Entire waterbody
S	Honey Run (Hope)	Swayzes Mill Road to Rt. 519, including Brookaloo Swamp and Muddy Brook
	Lake Aeroflex – see New Wawayanda Lake	
S	Mountain Lake (Liberty)	Entire waterbody
S	Muddy Brook (Hope) – see Honey Run	
S/W	New Wawayanda Lake (Andover) (a.k.a. Lake Aroflex)	Entire waterbody
S/F	Pequest River (Belvidere/Whittingham/Vienna Townsbury/Pequest)	Source downstream to Delaware River
S	Trout Brook (Hope)	Entire length

Pochuck Creek Drainage

S	Glenwood Brook (Glenwood)	Outlet of Glenwood Lake downstream to State line
S	Wawayanda Creek (Vernon)	Entire length
S	Wawayanda Lake (Wawayanda)	Entire waterbody

Pohatcong Creek Drainage

S	Brass Castle Creek (Brass Castle) (a.k.a. Roaring Rock Brook)	Entire length
S	Merrill Creek Reservoir (Harmony Twp.)	Entire waterbody
S/F	Pohatcong Creek (Mansfield/Pohatcong)	Mt. Bethel to Delaware River
	Roaring Rock Brook – see Brass Castle Creek	

Raccoon Creek Drainage

	Lake Nariticon – see Swedesboro Lake	
S/W	Mullica Hill Pond (Mullica Hill)	Entire waterbody
S/F	Swedesboro Lake (Swedesboro) (a.k.a Lake Nariticon)	Entire waterbody

Rahway River Drainage

S	Rahway River (Rahway)	I-78 bridge, Springfield to St. George Ave. (Rt. 27), Rahway
S	Diamond Mill Pond (Milburn)	Entire waterbody
S	Milton Lake (Rahway)	Madison Hill Road bridge to Milton Lake dam
S	Warinanco Park Pond (Roselle)	Entire waterbody

Rancocas Creek Drainage

S	Rancocas Creek (SW/Br.)(Medford)	Mill Street Park to Branch Street bridge (Medford)

Raritan Bay (Middlesex Co.) Drainage

S/W	Hooks Creek Lake (Cheesequake S.P.)	Entire waterbody

Raritan Bay (Monmouth Co.) Drainage

None

Raritan River Drainage

S/W	Amwell Lake (East Amwell)	Entire waterbody
S	Beaver Brook (Cokesbury/Annandale)	Entire length
	Black River – see Lamington River	Entire length
S	Capoolong (Cakepoulin) Creek (Sydney)	
S	Drakes Brook (Ledgewood/Flanders)	Entire length
S	Englishtown Mill Pond (Englishtown)	Entire waterbody
S/F	Farrington Lake (North Brunswick)	Entire waterbody
S	Green Brook (Watchung)	Rt. 527, Berkeley Heights to Rt. 22
S	India Brook (Randolph Twp.)	Mountainside Ave. to Rt. 24, Ralston
S	Ireland Brook (Paulus Corner)	Farrington Lake to point 500 feet upstream of Riva Ave.
S	Lake Papaianni (Edison)	Entire waterbody
S/F	Lamington (Black) River (Milltown/Pottersville)	Rt. 206 bridge (Chester) downstream to the posted Black River Fish & Game Club property at the lower end of Hacklebarney S.P.
S	Lamington River (Burnt Mills)	Rt. 523 bridge downstream to N/Br. Raritan River
S	Lawrence Brook (Deans)	Dam at Farrington Lake to 2nd railroad bridge(Raritan Railroad) below Main Street, Milltown
S/W	Lower Echo Park Pond (Mountainside)	Entire waterbody
S	Middle Brook (E/Br.)(Springdale)	Entire length
S	Mulhockaway Creek (Pattenburg)	Entire length
S	Neshanic River (Reaville)	Kuhl Road to Rt. 514
S	Peapack Brook (Peapack-Gladstone)	Entire length
S	Raritan River (Raritan)	Confluence of North and South branches downstream to Rt. 206 bridge (Raritan)
S/F	Raritan River (N/Br.)(Bedminster)	Rt. 512 bridge, a.k.a. Peapack Rd., downstream to confluence with S/Br. Raritan River
S/F	Raritan River (S/Br.)(Califon/Flemington/ Neshanic Station)	Budd Lake dam to jct. with N/Br. Raritan River
S	Rock Brook (Montgomery Twp.)	Entire length
S	Rockaway Creek (Whitehouse)	Entire length
S	Rockaway Creek (S/Br.)(Whitehouse)	Entire length
S/F	Roosevelt Park Pond (Edison)	Entire waterbody
S/F	Rosedale Lake (Rosedale)	Entire waterbody
S	Round Valley Reservoir (Clinton Twp.)	Entire waterbody
S	Seeleys Pond (Berkeley Heights)	Entire waterbody
S	Sidney Brook (Grandin) (a.k.a. Sydney Brook)	Entire length
S	Spooky Brook Park Pond (Franklin)	Entire length
S	Spruce Run (Glen Gardner)	Entire length
S	Spruce Run Reservoir (Union)	Entire waterbody
S	Stony Brook (Hopewell/Snydertown)	Woodsville to Port Mercer
	Sydney Brook – see Sidney Brook	Entire waterbody
S/W	Topenemus Lake (Freehold)	

Salem Creek Drainage

S/F	Schadlers Sand Wash Pond (Penns Grove)	Entire waterbody

Shark River Drainage

S	Shark River (Neptune)	Rt. 33 bridge downstream to Remsen Mill Road

Shrewsbury River Drainage

None

Stow Creek Drainage

None

Toms River Drainage

S/F	Toms River (Van Hiseville/Manchester)	Rt. 528 bridge in Cassville downstream to confluence with Maple Root Branch and Rt. 70 bridge to Rt. 571 bridge

Tuckahoe River Drainage

None

Wallkill River Drainage

S	Clove Brook (Sussex)(a.k.a. Clove River)	Jct. of Rt. 23 and Mt. Salem Road to Rt. 565 bridge
	Clove River – see Clove Brook	
S	Franklin Pond Creek (Hardyston Twp.)	Entire length
S	Papakating Creek (Wantage)	Plains Road bridge to Rt. 565
S	Papakating Creek (W/Br.)(Wantage)	Entire length
S/W	Silver Lake (Hamburg Mtn. Wildlife Management Area)	Entire waterbody
S/F	Wallkill River (Sparta/Franklin/Wantage)	Lake Mohawk dam to Rt. 23, Hamburg

Wreck Pond Creek Drainage

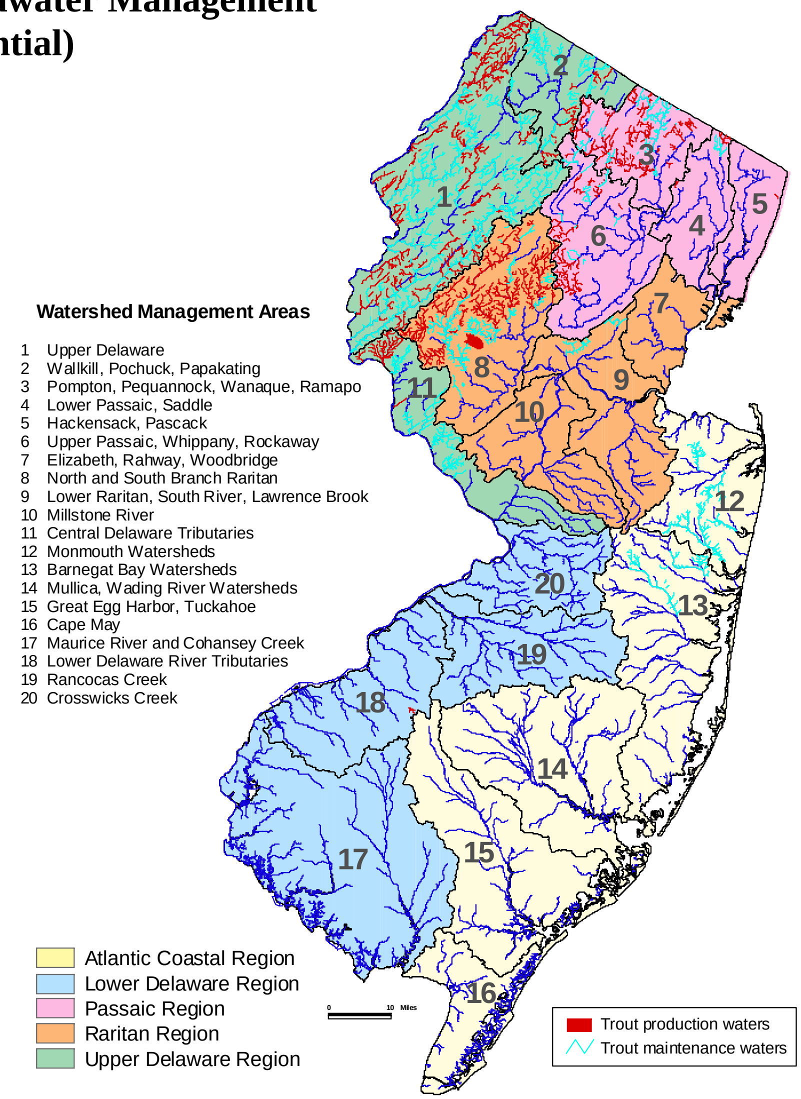
None

APPENDIX I

Inventory of Waterbodies for Coldwater Management
(Existing and Potential)

KEY

Field	Code	Description	Code	Description
County	AT	Atlantic	MI	Middlesex
	BE	Bergen	MN	Monmouth
	BU	Burlington	MR	Morris
	CA	Camden	OC	Ocean
	CM	Cape May	PA	Passaic
	CU	Cumberland	SA	Salem
	ES	Essex	SO	Somerset
	GL	Gloucester	SU	Sussex
	HD	Hudson	UN	Union
	HT	Hunterdon	WA	Warren
	ME	Mercer		
Owner	C	County	P	Private
	F	Federal	S	State
	M	Municipal		
Access	BL	Boat Liver	FS	Full Shoreline
	BR	Boat Ramp	PS	Partial Shoreline
	CT	Car top	NB	No Boating
Trout Waters Classification	TP	Trout Production	NT	Non Trout
	TM	Trout Maintenance		
Reproducing Trout Species	BKT	Brook Trout	RBT	Rainbow Trout
	BNT	Brown Trout	LKT	Lake Trout
Trout Stocked	S	Spring	W	Winter
	F	Fall		
Coldwater Mgmt. Strategy	S-CT	Seasonal Cultured Trout	SR	Sea Run
	YR-CT	Year-Round Cultured Trout	SS	Self Sustaining
Trout Regulations	GEN	Statewide General	STCA	Seasonal Trout Conservation Area
	TS-CI	Trout-Stocked with Closed Inseason stocking dates	FFA	Fly Fishing Area
	TS-OP	Trout-Stocked Open Preseason	TTL	Trophy Trout Lake
	WTS	Wild Trout Stream	HTL	Holdover Trout Lake
	YTCA	Year-round Trout Conservation Area	BW	Boundary Water



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Water Region: Atlantic Coastal

					Waterbody Size			Reproducing Trout Species								
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
15	Birch Grove Park Pond	AT	M	FS		30	NT					S,W	1987	S-CT	GEN	The winter stocking was very popular as determined from excellent tag returns. Good shoreline access makes this a popular destination.
	Clear Stream	OC			1.46		TM									Trout move into stream from South Branch of Metedeconk
16	Dennisville Lake	CM	M	PS,CT		50	NT					S	1962	S-CT	GEN	During 1990 the lake was removed from the spring trout stocking list as a result of a no stopping ordinance enacted on Rt. 47. In 1993 an arrangement was made with the Dennisville Township Fire Department to allow trout anglers to park in the back of their building rather than on Rt. 47. The lake was placed back on the stocking list during 1994.
13	Forked River													-		
12	Garvey's Pond	MN	M			2						S	1996	S-CT		
15	Great Egg Harbor River	CA,AT	S	PS,CT			NT						2001	-	GEN	This scenic river passes through the Winslow Wildlife Management Area.
15	Hammonton Lake	AT	SM,P	PS,CT, BR		75	NT					S,F	1984	S-CT	GEN	
12	Hockhocksen Brook				3.8		TM					S	1981	S-CT		
12	Holmdel Park Pond	MN	C			5						S	1974	S-CT		
13	Lake Shenandoah	OC	C	BR,PS, BL		50	NT					S	1990	S-CT	TS-OP	Fish ladder; some reports of trout downstream. No fishing at dam.
12	Mac's Pond	MN	M	NB,FS		2	NT					S	1988	S-CT		Stocked only once preseason.
12	Manasquan Reservoir	MN	NJWS A	BR,PS, BL		720	NT					S	1996	S-CT	TS-OP	Brook trout and rainbox trout stocked. Mostly brook trout caught. No fishing at dam.
12	Manasquan River	MN	M,S		11.4		TM					S,F	1983	S-CT	TS-CI	Searun brown trout.
13	Metedeconk River	OC					NT						1977	-		
13	Metedeconk River (N/Br.)	OC					TM					S,F	1971	S-CT		
13	Metedeconk River (S/Br.)	OC	M,C				NT					S,F	1971	S-CT		

					Waterbody Size			Reproducing Trout Species								
WR	**Waterbody**	**County**	**Owner**	**Access**	**Miles**	**Acres**	**Trout Class**	**Bkt**	**Bnt**	**Rbt**	**Lkt**	**Trout Stocked (S/F/W)**	**Year Last Sampled**	**Coldwater Mgmt Objective**	**Trout Regulations (yr adopted)**	**Comments**
12	Mingamahone Brook	MN	S		7.18		TM					S	1988	S-CT	GEN	
12	Mingamahone Brook (E/Br.)	MN	S				NT							-		
	Muddy Ford Brook	OC			1.17									-		
12	Mohawk Pond													S-CT		
14	Mullica River	BU,AT, CA		PS,CT										S-CT	GEN	
12	Navesink River													-		
18	Oak Pond	CA	S	FS,CT, BR		12	NT					S,F,W	1964	S-CT	GEN	Oak Pond has excellent shoreline access and a shallow boat launching area that is ideal for car top boats.
	Oyster Creek													-		
12	Pine Brook													-		
12	(Clarksmills)						NT						1997	-		
12	(Cooksmills)				2.43		TM					S	1997	-		
13	Pohatcong Lake	OC	M,P	PS,CT, BR		33	NT					S	UNK	S-CT	GEN	A new addition in 2002 this lake has good shoreline access along Rt. 9 and a small concrete boat ramp.
	Ramanassen Brook	OC			4.87									-		
12	Shadow Lake	MN	M,P			88						S	1997	S-CT		
	Shark River													S-CT		
12	(Belmar, Colts Neck)	MN					NT							-	GEN	Some reports of searun trout.
12	(Neptune)	MN	C,M		4.03		TM							-	GEN	
12	Shrewsbury River						NT							-		
	Spring Lake	MN	M	NB,FS		16	NT					S,W	1970	S-CT	GEN	
	Takanassee Lake	MN	M	NB,FS		14	NT					S,W		S-CT	GEN	Fish ladder to ocean.
	Titmouse Brook				1.01		TM							-		
13	Toms River	OC	M,S				TM					S,F	1986	S-CT YR-CT	TSI-CI, YTCA	Local chapter of T.U. very active - floatstock. Some reports of searun trout.
15	Tuckahoe River	AT,CU	S	PS,CT			NT						1977		GEN	
16	West Pond	CM	C,P	PS		3	NT					S	UNK	S-CT	GEN	This shallow pond warms quickly in the spring.
	Wreck Pond Creek													-		
12	Yellow Brook													S-CT		

Water Region: Lower Delaware

					Waterbody Size			Reproducing Trout Species								
WR	**Waterbody**	**County**	**Owner**	**Access**	**Miles**	**Acres**	**Trout Class**	**Bkt**	**Bnt**	**Rbt**	**Lkt**	**Trout Stocked (S/F/W)**	**Year Last Sampled**	**Coldwater Mgmt Objective**	**Trout Regulations (yr adopted)**	**Comments**
18	Alloway Creek	SA		PS			NT						2000	S-CT	GEN	
20	Assiscunk Creek	BU		PS			NT						2001	S-CT	GEN	
19	Big Timber Creek	CA,GL		PS			NT						2002	S-CT	GEN	
17	Bostwick Lake	CU	M	BR,CT, PS		32	NT					S	1965	S-CT	GEN	Bostwick Lake was removed from the trout stocking schedule in 2000 when the dam failed due to a rain event. The lake will be placed back on the list when dam repairs are completed. Repairs are antipicated to occur in spring 2004.
	Cohansey Creek			PS			NT							S-CT	GEN	
17	Cohansey River	SA,CU	C	PS,CT	3.2		NT					S	2000	S-CT	GEN	
19	Cooper River	CA		PS			NT						1997	S-CT	GEN	
20	Crosswicks Creek	BU		PS			NT						2000	S-CT	GEN	
19	Crystal Lake	BU	M	PS		20	NT					S,F	UNK	S-CT	GEN	
17	Giampetro Park Lake	CU	M	PS,BR, CT		11	NT					SF	UNK	S-CT	GEN	Giampietro Park Pond provides anglers with boat access and ample shoreline access. The high population density and accessibility make this lake a popular location.
18	Greenwich Lake	GL	M	PS,BR, CT		20	NT					SF	UNK	S-CT	GEN	Good shoreline access as well as a concrete boat ramp make this a popular location.
18	Grenloch Lake	GL	P	BR,CT, PS		8	NT					SF	UNK	S-CT	GEN	Partial shoreline access as well as a concrete boat ramp make this a popular location.

					Waterbody Size			Reproducing Trout Species								
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
18	Haddon Lake	CA	C	CT,FS		10	NT					S	UNK	S-CT	GEN	A recent dredging project completed in 2001 has provided anglers with years of contiued use. The lake was restocked with warmwater fish, and was placed back on the stocking lists for trout and channel catfish. This lake provides anglers with almost 100% shoreline access. An artificial habitat project is slated for spring 2003.
18	Harrisonville Lake	GL	S	PS,CT		30	NT					S	1966	S-CT	GEN	
17	Iona Lake	GL	M	PS,CT		36	NT					SF	1967	S-CT	GEN	
18	Lake Nariticon - see Swedesboro Lake						NT							S-CT	GEN	
19	Laurel Pond	BU	M	FS		2.5	NT					S	UNK	S-CT	GEN	This Burlington County park pond is popular among local anglers. There is 100% shoreline access. The pond also has a good warmwater fishery. The lake was removed from the winter trout stocking list due to conflicts with owners and anglers.
18	Mantua Creek	GL		PS			NT						2000	S-CT	GEN	
17	Mary Elmer Lake	CU	M	PS,BR, CT		18	NT					SF	1957	S-CT	GEN	
18	Masons Run	CA	P	R	1.05		TP	X					2002	SS		The unique stream is the only current documented, reproducing brook trout stream in south Jersey. Situated in close proximity to the Pine Hill Golf Course, a sedimentation event resulted in the formation of the Pine Hill Conservation Management Team. The partners of this group comprised of NJF&W, USFWS, Trout Unlimited, Camden County Soil District, Borough of Pine Hill, and the Pine Hill Golf Course meet bi-monthly to discuss issues relating to Masons Run and surrounding areas.
17	Maurice River	CU	S	PS,CT	11		NT					SF	2002	S-CT	GEN	

WR	Waterbody	County	Owner	Access	Waterbody Size: Miles	Waterbody Size: Acres	Trout Class	Reproducing Trout Species: Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
18	Mullica Hill Pond	GL	P	PS,CT		10	NT					SW	1970	S-CT	GEN	
18	Oldmans Creek	GL,SA		PS			NT						2000	S-CT	GEN	
19	Pennsauken Creek	BU,CA		PS			NT						1993	S-CT	GEN	
20	Prospertown Lake	OC	S	BR,PS, CT		80	NT					S		S-CT	TSCI	The WMA lake has partial shoreline access along the parking area, as well as a fishing pier. Anglers that want to fish from a boat will have to paddle or row, due to motor restrictions. A concrete ramp is present. This is always a popular destination during the spring trout season.
18	Raccoon Creek	GL		PS			NT						1976	S-CT	GEN	
19	Rancocas Creek	BU		PS			NT						2002	S-CT	GEN	
19	Rancocas Creek (SW/Br.)	BU		PS			NT					S	2002	S-CT	GEN	
18	Riverview Beach Pond	SA	M	FS,CT		5	NT					SW	UNK	S-CT	GEN	
18	Rowands Pond	CA	S	FS		3	NT					SW	1969	S-CT	GEN	
18	Salem River	SA		PS			NT						2000	S-CT	GEN	
18	Schadlers Sand Wash Pond	SA	P	PS		5	NT					SF	UNK	S-CT	GEN	
17	Shaws Mill Pond	CU	S	BR,CT, FS		30	NT					SW	2002	S-CT	GEN	
17	Stow Creek	CU,SA		PS			NT						2000	S-CT	GEN	
18	Swedesboro Lake	GL	M	CT,PS		20	NT					SF	2000	S-CT	GEN	Paritial shoreline access, limited parking along road.
20	Sylvan Lake	BU	M,P	BR,CT, PS		12	NT					SF	1970	S-CT	GEN	Sylvan lake was recently dredged in 2002. A small concrete boat launch was created in addition to a fishing pier. Artificial habitat structures were deployed to provide cover for warmwater fish.
18	Westville Lake	GL	M	PS		1.5	NT					S	UNK	S-CT	GEN	

Water Region: Passaic

					Waterbody Size			Reproducing Trout Species				Trout Stocked				
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	(S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
3	Apshawa Brook	PA	P		1.67		TP		X				1988	SS	GEN	
6	Bear Swamp Brook	BE	S,P		2.16		TP	X					1971	SS	WTS	
4	Barbour’s Pond	PA	C	FS,NB		12	NT					S,W	1952	S-CT	GEN	
	Beaver Brook															
6	Splitrock Reservoir Dam downstream to Meriden Rd. Bridge	MR	S,P		1.24		TP	X					1991	SS	GEN	
6	Meriden Rd. bridge to Rockaway River	MR	P				NT					S	1991	S-CT	GEN	
	Beaver Brook - Unnamed Tributaries															
6	Trib. (Meriden)	MR	C		0.24		TP	X					1991	SS	GEN	very small; non-blueline stream
6	Trib. (Meriden)	MR	C		0.44		TP	X				S	1991	SS	GEN	very small; non-blueline stream
3	Beech Brook	PA	S,C,P		1.99		TP*						2003	SS	GEN*	* Pending
3	Belcher Creek	PA	P				NT						1970		GEN	
	Black Brook															
6	(Upper Passaic River drainage)	MR	F,P										1969		GEN	
6	(Whippany River drainage)	MR	P										1980		GEN	
3	Blue Mine Brook															
	Source - Snake Den Road bridge	PA	S,P		1.04		TP	X					1988	SS	GEN	
	Snake Den Road bridge - Wanaque Reservior	PA	S,P		0.92		TM						1988		GEN	
4	Branch Brook Park Lake	ES	L	BL,FS, NB		24	NT					S	1984	S-CT	GEN	
6	Burnham Park Pond	MR	M	NB,FS		4	NT					S		S-CT	GEN	very popular spring trout fishery.
3	Burnt Meadow Brook	PA	P,S		4.18		TP	X					1986	SS	GEN	
3	Canistear Reservoir	SU	M	BR,FS		350	TM					S	1999	S-CT	GEN	Fishing by permit; marginal holdover trout fishery

					Waterbody Size		Trout	Reproducing Trout Species				Trout Stocked (S/F/W)	Year Last	Coldwater Mgmt	Trout Regulations	
WR	Waterbody	County	Owner	Access	Miles	Acres	Class	Bkt	Bnt	Rbt	Lkt		Sampled	Objective	(yr adopted)	Comments
3	Charlotteburg Reservoir	PA	M	NONE		375	TM						Not Sampled		GEN	Newark Watershed; no fishing allowed
3	Cherry Ridge Brook	SU	S,M,P				NT						1974		GEN	
4	Clarks Pond	ES	M	FS,NB		7	NT					S	1969	S-CT	GEN	Shocked pre-season only; siened for derby request.
3	Clinton Brook	PA	M		1.96		TP		X				1974	SS	GEN	Greatly affected by releases from Clinton Res.; no fishing allowed
3	Clinton Reservoir	PA	M	BR,FS		423	TM					S	2001	YR-CT	HTL	Newark Watershed; fishing by permit
3	Cooley Brook	PA	S,P		2.36		TP	X	X				2001	SS	GEN	
5	Cresskill Brook	BE	P		1.14		TP	X					1983	SS	GEN	Only identified T.P. stream in the Hackensack Drainage
	Crooked Brook - Unnamed Tributaries															
6	Trib. (E. of Sheep Hill)	MR	P		1.1		TP	X					1995	SS	GEN	
3	Cupsaw Brook	P	P,S				NT						1985		GEN	
6	Dead River	SO	P				NT						1969		GEN	
6	Den Brook	MR	P,M				NT						1988		GEN	
	Den Brook - Unnamed Tributaries															
6	Trib. (West of Shongum Lake)	MR	C,P		1.25		TP	X					1988	SS	GEN	
3	Fox Brook	BE	P				NT						1968		GEN	
4	Goffle Brook	PA	M				NT						1968		GEN	No potential for coldwater fishery
6	Grannis Brook	MR	P				NT						1969		GEN	No potential for coldwater fishery
6	Great Brook	MR	P,F				NT						1969		GEN	
3	Green Brook	PA	S,P		3.37		TP		X				2003	SS	GEN	
6	Green Pond	MR	P	R		499	TM						1951		GEN	Fishing allowed only to Lake Assoc. members - trout stocked
6	Green Pond Brook															
	Green Pond Outlet to Picatinny Lake	MR	P,F		3.13		TP	X					1969	SS	GEN	
	Picatinny Lake to Rockaway River	MR	P,F				NT						Not Sampled		GEN	

					Waterbody Size		Trout	Reproducing Trout Species				Trout Stocked		Coldwater	Trout	
WR	Waterbody	County	Owner	Access	Miles	Acres	Class	Bkt	Bnt	Rbt	Lkt	(S/F/W)	Year Last Sampled	Mgmt Objective	Regulations (yr adopted)	Comments
3	Green Turtle Pond	PA	S	BR,FS		40	NT						1983		GEN	Should be considered for spring and winter trout stocking
6	Greenwood Lake	PA	S,P	BR,PS		1920	TM						1997		BW	
5	Hackensack River	BE,HD	M,P				NT					S	1976	S-CT	GEN	
6	Harmony Brook	MR	P		1.19		TP		X	X			2001	SS	GEN	
6	Harrisons Brook	SO	P				NT						1969		GEN	Dropped from trout stocking program 2001
3	Havemeyer Brook	BE	P		1.83		TP	X					1983	SS	GEN	
3	Hewitt Brook	PA	S,P		2.44		TP	X					2001	SS	GEN	
	Hibernia Brook															
6	Source to first Green Pond Road bridge downstream of Lake Emma	MR	S,M,P		1.28		TP	X					1995	SS	GEN	
6	First Green Pond Road bridge to Beaver Brook	MR	S,M,P		2.97		TM					S	1995	YR-CT	GEN	Trout stocked downstream of Lake Ames
	Hibernia Brook - Unnamed Tributaries															
6	Trib. (Lake Ames)	MR	F,M		1.5		TP	X					1985	SS	GEN	
3	High Mountain Brook	PA	S,P		2.99		TP	X					1982	SS	GEN	
4	Hohokus Brook	BE	C,P				NT					S	1968	S-CT	GEN	May be opportunity to expand trout stocking in Ridgewood
6	Indian Grove Brook	MR	F,P		2.08		TP			X			1996	SS	WTS	
5	Indian Lake	BE	M	FS		6	NT					S	1977	S-CT	GEN	
6	Jackson Brook														GEN	
6	Source downstream to Hurd Park	MR	C,P		2.7		TP		X				2001		WTS	Good number of harvestable size trout
6	Hurd Park downstream to the Rockaway	MR	C,P				NT						Not Sampled		GEN	
3	Jennings Creek	PA	S		1.03		TP	X					1963	SS	GEN	No data to indicate TP waters
6	Jersey City Reservoir	MR	P	PS		775	TM						1996		GEN	Shoreline fishing by permit only
3	Kanouse Brook	PA	M,P		4.49		TP	X					1988	SS	GEN	Newark Watershed - Fishing not allowed

					Waterbody Size			Reproducing Trout Species				Trout Stocked (S/F/W)				
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt		Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
3	Kikeout Brook (see Kakeout Brook)	MR	P				TP*		X				2003	SS	GEN	* Pending
3	Lake Stockholm Brook	SU	P		2.29		TP	X					1997	SS	GEN	
3	Little Pond Brook	BE	P		1.13		TP	X	X				1995	SS	GEN	
6	Loantaka Brook	MR	C,P				NT						1969		GEN	
	Macopin River															
	Echo Lake Reservvoir to Pequannock River	PA	M		1.84		TP		X				2001	SS		Newark Watershed; fishing not allowed
	Upstream of Echo Lake Reservoir	PA	M,P				NT						Not Sampled			
	Meadow Brook															
	Skyline Lake downstream to E. Belmont Ave bridge	PA	P				NT						No Data			
3	E. Belmont Ave bridge downstream to Wanaque river	PA	P		0.89		TP		X				1993	SS	GEN	
	Mill Brook															
6	Source to Rt. 10	MR	P		3.05		TP	X	X			S	1997	SS YR-CT	GEN	Consider dropping from trout stocking program; good number of harvestable size native trout - consider for WTS.
6	Rt 10 to Rockway river	MR	P		0.65		TM						1998		GEN	Adult stocked and native trout present
6	Trib. (North of Union Hill)	MR			0.5		TP							SS	GEN	
5	Mill Pond (see Electric Light Pond)	BE		PS		9	NT					S,W	1984	S-CT		
3	Monksville Reservoir	PA	S	BR,BL,FS		505	TM					S	2002	YR-CT	HTL	
3	Mossmans Brook (aka Clinton Brook)	PA	M		3.56		TP		X				1988	SS		Newark Watershed - fishing not allowed
6	Mt. Hope Pond	MR	M			18	NT					S,W	1985	S-CT	GEN	Marginal trout maintenance - needs to be re-sampled
6	Mt. Tabor Brook	MR	P				NT						1969		GEN	
3	Oak Ridge Reservoir	PA	P	BR,FS		482	TM						Not Sampled		GEN	Newark Watershed; fishing by permit

					Waterbody Size			Reproducing Trout Species				Trout Stocked (S/F/W)				
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt		Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
6	Ohio Brook	MR	C,P		0.71		TM						1991		GEN	
4	Oldham Pond	PA	M			15	NT					S	Not Sampled		GEN	
3	Pacack Brook	SU	M				NT						1974		GEN	Newark Watershed; fishing not allowed
5	Pascack Creek	BE	P				NT					S	1968	S-CT	GEN	
	Passaic River															
6	Source downstream to Osborn Pond	MR	F,P		5.11		TP		X	X			1999	SS	WTS	WTS to Rt. 202 bridge
4,6	Osborn Pond to Dundee Lake dam	MR,PA	F,C,M,P				NT					S	1980	S-CT	GEN	
4	Dundee Lake dam to confluence with Second River	PA,ES	M,P				NT/SE						1999		GEN	Tidal freshwater below Dundee Dam
4	Peckman River	ES	M,P		2.61		NT						1999		GEN	TM classification pending trout stocked by Friends of the Peckman River.
	Pequannock River															
3	Source to Hamburg Turnpike bridge in Pompton Lakes Boro	SU,MR, PA	M,P		20.98		TP	X	X			S	2001	SS YR-CT	WTS, STCA	One mile section between Charlottsburg Res. and Macopin Res. is pending
3	Hamburg Turnpike bridge in Pompton Lakes Boro to confluence with Wanaque River	MR, PA	M,P		0.85		TM						1991			
3	Confluence with Wanaque River downstream to confluence with Pompton River	MR,PA	M,P				NT						1980			
	Pequannock River - Unnamed Tributaries															
3	Trib. (Copperas Mtn.)	MR	P		2.27		TP	X	X				2001	SS	GEN	
3	Trib. (Lake Kampfe)	PA	S,P		0.35		TM						1987		GEN	
3	Trib. (Lake Kampfe)	PA	P				NT						1987		GEN	
3	Trib. (Smoke Rise)	MR	C,P		0.71		TP	X					?		GEN	

					Waterbody Size			Reproducing Trout Species				Trout Stocked (S/F/W)				
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt		Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
3	Pompton Lake	PA	M	BR,PS			NT					S	1997	S-CT	GEN	
3	Pompton River	MR,PA	M,P				NT					S	1997	S-CT	GEN	
4	Preakness Brook	PA	M,P		0.95		TP	X					1981	SS	GEN	
	Primrose Brook															
6	Source downstream to Lees Hill Rd. bridge	MR	F,P		3.6		TP	X	X				1999	SS	GEN	
6	Lees Hill Road bridge to Great Brook	MR	F,P				NT						1987		GEN	
3	Ramapo River	BE,PA	C,M,P				NT					S,F	2003	S-CT	GEN	
	Ramapo River - Unnamed Tributaries															
3	Trib. (Oakland)	BE	P		1.32		TP	X					1986	SS	GEN	
3	Ringwood Brook	PA	S		1.42		TM					S	1990	YR-CT	GEN	
6	Rockaway River															
	Longwood Lake downstream to Washington Pond	MR	S,M,P				NT					S,F	1988	S-CT	GEN	
6	Washington Pond downstream to Route 46	MR	S,M,P		1		TM					S,F	1988	YR-CT	GEN	
6	Route 46 downstream to the Passaic River	MR	S,M,P				NT					S,F	1988	S-CT	GEN	
6	Russia Brook															
	Source to Lake Hartung	MR	S,P				NT						1997		GEN	
	Lake Hartung dam to Lake Swannanoa	MR	P		2.3		TM					S	1998	S-CT	GEN	
	Russia Brook - Unnamed Tributaries															
6	Trib. (Mt. Paul)	MR	P		1.52		TP	X					1998	SS	GEN	
	Saddle River															
4	Stateline downstream to Rt. 2 bridge	BE	P		1.45		TP						2002	SS	WTS	Good number of harvestable size trout
4	Rt. 2 bridge downstream to Allendale Rd. bridge	BE	P		2.06		TM					S	1968	YR-CT	GEN	
4	Allendale Road bridge to Passaic River	BE	C,P				NT/SE					S	1980	S-CT	GEN	

WR	Waterbody	County	Owner	Access	Waterbody Size Miles	Waterbody Size Acres	Trout Class	Reproducing Trout Species Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
3	Scarlet Oak Pond	BE	C	NB,FS		22	TM					S	1994	YR-CT	GEN	Trout stocked preseason only; boat fishing not allowed
3	Sheppard Lake	PA	S	BR,FS		74	TM					S,W	1999	YR-CT	HTL	
6	Speedwell Lake	MR	M	NB,FS		23	NT					S,W	1965	S-CT	GEN	
6	Splitrock Reservoir	MR	M	CT		550	TM						2000		GEN	
3	Stag Brook (aka Clove Brook)	BE	P		1.82		TP	X					2003	SS	GEN	Susceptible to extremely low summer flows
3	Stone House Brook	MR	P				NT						1969		GEN	
6	Stony Brook	MR	P				NT						1969		GEN	
5	Tenakill Brook	BE	P				NT					S	No Data	S-CT	GEN	
5	Tienakill Creek – see Tenakill Brook															
3	Timber Brook	MR	M,S				NT						1985		GEN	
4	Verona Park Lake	ES	C	BL,FS			NT					S,W	1979	S-CT	GEN	
	Wallace Brook	MR	C		1		TP		X				2000	SS	GEN	
3	Wanaque Reservoir	PA	P	PS			TM						1991		GEN	Shoreline fishing by permit
3	Wanaque River	PA	S,M,P			2310	TM/NT					S,F	1992	S-CT YR-CT	GEN	
	Wanaque River - Unnamed Tributaries															
3	Trib. (S. of Jennings Creek)	PA	S		0.78		TP	X					No Data	SS	GEN	
3	West Brook	PA	P		4.49		TP			X			2002	SS	WTS	
4	West Hudson County Park Pond	HD	C	NB,FS		4	NT					S	1984	S-CT	GEN	Preseason trout stocking only
	Whippany River															
	Source to Tingley Road bridge	MR	M,P		2.0		TP		X	X			2002	SS	WTS	Good number of harvestable size trout
	Tingley Road bridge to Whitehead Road bridge	MR	M		1.0		TP		X			S	2002	SS S-CT	GEN	
	Whitehead Road bridge to Rockaway River	MR	M,P,S				NT					S	1980	S-CT	GEN	Sample by freshwater biomonitoring in 2000.
	Whippany River - Unnamed Tributaries															

					Waterbody Size			Reproducing Trout Species				Trout Stocked (S/F/W)				
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt		Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
6	Trib. (Brookside) aka Dismal Brook	MR	M		2.48		TP			X			2001	SS	GEN	
6	Trib. (E. of Brookside)	MR	P		2.01		TM						1994		GEN	
6	Trib. (E. of Washington Valley)	MR	P		2.18		TM						1994		GEN	
6	Trib. (Gillespie Hill)	MR	P		1.67		TP	X					1987	SS	GEN	
6	Trib. (Shongum Mtn.)	MR	C,P				NT						?		GEN	
4	Whites Pond	BE	M	NB,FS		6	NT					S	1969	S-CT	GEN	
5	Woodcliff Lake	HD	C	NB,FS		15	NT					S,W	1996	S-CT	GEN	

Water Region: Raritan

WR	Waterbody	County	Owner	Access	Waterbody Size Miles	Waterbody Size Acres	Trout Class	Reproducing Trout Species Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
10	Amwell Lake	HT	S	FS, CT	-		NT					S,W	9/15/1970	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Beaver Brook															
	Source downstream to Reformatory Rd	HT	P,S		3.57	-	TP		X			-	9/1/1996	SS	GEN	
	Reformatory Rd bridge downstream to Beaver Ave (Annandale)	HT	P,S		0.94	-	TM					-	9/1/1998	SS-S-CT	GEN	
	Beaver Ave bridge downstream to lower most I-78 bridge	HT	P		1.45	-	TP		X			S	8/28/2001	SS-S-CT	GEN	
	Lower most I-78 bridge to confluence with S/Br Raritan	HT	M,P		0.63	-	TM					S	7/15/1996	SS-S-CT	GEN	
	Bamboo Brook - see Herzog															
8	Black Brook	HT	P,S		1.12	-	TP	X		X		-	9/15/1980	SS	GEN	Access limited to Clinton Wildlife Management Area
8	Black River – see also Lamington River															
	source downstream to Rt 206 bridge	MR	P,S			-	NT					-			GEN	
	Rt 206 downstream to Rhinehart Bk confluence	MR	P,S		3.5	-	TM						8/28/1969	S-CT	GEN	
	see Lamington River for remaining information															
8	Boulder Hill Brook	HT	P		2.12	-	TP		X			-		SS	GEN	
	Buffalo Hollow Brook - see Wilhoughby															
8	Burnett Brook	MR	M,P		4.64	-	TP		X			-	8/7/1969	SS	WTS	
	Buskill Brook				0.63		TM							-		
8	Capoolong Creek	HT	P,S		5.61	-	TP		X			S	8/12/2002	SS	GEN	

					Waterbody Size			Reproducing Trout Species				Trout		Coldwater	Trout	
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	Stocked (S/F/W)	Year Last Sampled	Mgmt Objective	Regulations (yr adopted)	Comments
8	Cold Brook	HT	P,M	None	3.31	-	TP		X			-	8/22/2002	SS	WTS	Excellent in-stream habitat, good flow even under recent drought conditions
8	Dawsons Brook	MR	P		2.04	-	TP	X				-	8/12/1969	SS	GEN	
9	D & R Canal	SO,ME	S			-	NT					S		S-CT	GEN	Stocked from access road to Beef-a-lo Farm to Whitehead Rd bridge for a seasonal trout fishery. Elevated water temperatures do not support holdover trout.
7	Diamond Mill Pond	ES	C		-	4	NT					S	6/20/1974	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Drake's Brook													-		
	source downstream to Hillside Ave Bridge	MR	P,M		3.14	-	TM					S	7/24/1990	YR-CT	GEN	
	Hillside Ave bridge downstream to confluence Rariatn River S/Br	MR	P			-	NT					S	8/25/1987	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
	Drake's Brook - Unnamed Tributaries															
	Trib. (Mt. Olive)	MR	P		0.76	-	TP	X				-	8/16/1994	SS	GEN	
	Trib.				1.44		TM									
8	Electric Brook	MR	P,C		2.41	-	TP	X	X			-	8/25/1981	SS	GEN	
9	Englishtown Mill Pond	MN	M,P		-	6	NT					S	9/20/1965	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
9	Farrington Lake	MI	M,P,	PS, BR	-	290	NT					S,F	6/23/2000	S-CT	GEN	Very popular during spring and fall trout stocking seasons, however, elevated summer water temperatures do not support holdover trout
8	Flanders Brook	MR	P,S		2.29	-	TP	X	X	X		-	8/26/1998	SS	WTS	One of the few streams within New Jersey which supports reproducing populations of all three stream species of trout
8	Frog Hollow Brook	HT	P		2.73	-	TP	X		X		-	7/13/1995	SS	GEN	

					Waterbody Size			Reproducing Trout Species								
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
12	Garvey's Pond	MO	M	PS	-	2	NT					S	9/19/1996	S-CT	GEN	Very popular during the spring stocking period, in an area with limited freshwater fishing opportunities
8	Gladstone Brook	SO	P	None	2.29	-	TP		X			-	8/14/2002	SS	GEN	Loss of gradient and extensive erosion from adjacent pastures reproducing trout populations is limited
7	Green Brook															
	source downstream to Rt 22 bridge	UN	P,M		3.43	-	TM					S	6/9/1976	YR-CT	GEN	
	Rt 22 bridge downstream to confluence with Bound Brook	UN	P,M			-	NT					-	9/25/1997	-	GEN	
8	Guinea Hollow Brook	HT	P	None	2.16	-	TP		X			-	8/12/81	SS	GEN	
8	Hacklebarney Brook	MR	S,P		1.23	-	TP	X				-	9/18/1970	SS	GEN	
8	Herzog Brook	SO	P	None	4.17	-	TP	X	X			-	7/9/1996	SS	WTS	
8	Hickory Run	HT	P		0.78	-	TP			X		-	8/23/2002	SS	WTS	Historically designated with rainbow trout reproduction recent samplin g in 2002 yielded only brook trout reproduction with only 1 rainbow captured.
8	Hollow Brook	HT	P		3.07	-	TP	X	X			-	7/13/1983	SS	GEN	
12	Holmdel Park Pond	MO	C	FS	-	5	NT					S	5/10/1974	S-CT	GEN	
9	Hook's Creek Lake	MI	S	FS	-	10	NT					S,W		S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	India Brook															
	Source downstream to Mountainside Ave, Mendham	MR	M,P		3.56	-	TP	X	X			-	8/24/1994	SS	WTS	
	Mountainside Ave to Rt 24, Ralston	MR	P,M		0.44	-	TP	X	X			S	8/18/1994	SS,YR-CT	GEN	
	Rt 24 downstream to confluence with Raritan River N/Br	MR	P		0.48	-	TP	X	X			-	7/9/1982	SS	GEN	

					Waterbody Size			Reproducing Trout Species								
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
9	Ireland Brook	MI	P,M				NT					S	9/26/1996	S-CT	GEN	
8	Krueger's Creek	MR	P		1.22	-	TP	X					8/24/1989	SS	GEN	
9	Lake Papaianni	MI	M	FS			NT					S	6/18/1997	S-CT	GEN	Stocked once during pre-season stocking period only. Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Lamington River–see also Black River															
	see Black River listing for information upstream of Rhinehart Brook confluence															
	Rhinehart Brook confluence to Camp Brady bridge	MR,SO	S,P		5.68	-	TP		X			-	7/15/1969	SS	GEN	
	Camp Brady Bridge downstream to Rt 523 bridge	SO	P		2.72	-	TM					-	7/25/1969	S-CT	GEN	
	Rt 523 bridge downstream to Raritan River N/Br	SO	P,M			-	NT					S	10/12/1973	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
	Lamington River - Unnamed Tributaries															
8	Trib. (Ironia)	MR	P		0.58	-	TP	X				-		SS	GEN	
9	Lawrence Brook	MI	P,M			-	NT					S	7/1/1977	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Ledgewood Brook	MR	P		1.04		TP		X			-	9/13/2002	SS	WTS	
8	Little Brook	HT	P		2.06	-	TP	X				-	9/12/1969	SS	GEN	
	Lomerson Brook - see Herzog Brook															
7	Lower Echo Park Pond	UN	C	FS	-	6	NT					S,W	8/14/1979	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	McVickers Brook	MR	P		1.87	-	TM					-	7/11/1996	-	GEN	

					Waterbody Size			Reproducing Trout Species				Trout Stocked	Year Last	Coldwater Mgmt	Trout Regulations	
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	(S/F/W)	Sampled	Objective	(yr adopted)	Comments
9	Middle Brook (E/Br.)	SO	P		4.47	-	TM					S	9/7/1989	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
7	Milton Lake	UN	M	PS	-	10	NT					S	9/12/1980	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Mine Brook	MR	P			-	NT					-	8/18/1989	-	GEN	
	Mine Brook - Unnamed Tributaries															
8	Trib. (E. of Mine Mtn.)	MR	P		1.74	-	TP	X				-	9/15/1995	SS	GEN	
8	Trib. (S. of Mine Mtn.)	MR	P		0.3	-	TP	X				-	9/15/1995	SS	GEN	
8	Mulhockaway Creek	HT	S,P		4.68	-	TP	X	X	X		S	8/13/2002	SS	GEN	
8	Neshanic River	SO	P			-	NT					S	7/25/1974	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Norton Brook	HT	P		2.14	-	TP	X				-	9/14/1970	SS	GEN	
8	Oakdale Creek	MR	P	None	0.77	-	TP	X						SS	GEN	
8	Peapack Brook	SO	P,M		2.31	-	TP		X			S	8/14/2002	SS	GEN	
8	Prescott Brook	HT	P		3.37	-	TM					-	7/5/1996	-	GEN	
7	Rahway River	UN	P,M			-	NT					S	10/3/1973	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
9	Raritan River	SO,MI	P,M			-	NT					S	8/7/1998	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
9	Raritan River (N/Br.)															
	source downstream to Ravine Lake	MR	P		5.64	-	TP		X			-	7/8/1980	SS	GEN	
	Ravine Lake dam downstream to Rt 512 bridge	MR	P		2.06	-	TM					S		S-CT	GEN	
	Rt 512 bridge downstream to confluence with S/Br Raritan	SR	P,M			-	NT					S	7/17/1974	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.

WR	Waterbody	County	Owner	Access	Waterbody Size Miles	Waterbody Size Acres	Trout Class	Reproducing Trout Species Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
8	Raritan River (S/Br.)															
8	Budd Lk Dam to Turkey Bk	MR	P			-	NT					S,F	8/22/1969	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	from dam upstream of Flanders-Drakestown Rd to Turkey Bk confluence	MR	P		0.5	-	TM					S,F	8/18/1969	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Turkey Bk to Claremont YTCA	MR	P		4.75	-	TP	X	X			S,F	8/18/1969	SS, YR-CT	GEN	
8	Claremont (YTCA stretch)	MR	C		1.1	-	TP	X	X			-	9/28/2001	SS, YR-CT	YTCA	
8	End of YTCA stretch to Rt 512	MR,HT	P		6.2	-	TP	X	X			S,F	9/5/1995	SS, YR-CT	GEN	
8	Rt 512 to Ken Lockwood Gorge	HT	P		1.54	-	TM					S,F		YR-CT	GEN	
8	Ken Lockwood Gorge WMA	HT	S		2.5	-	TM					S,F	8/30/1994	YR-CT	YTCA	
8	downstream KLG WMA to Packers Island	HT	P,C,M		11.23	-	TM					S,F	8/7/1970	YR-CT	GEN	
8	Packers Island to confluence with N/Br Raritan	HT,SO	P,C			-	NT					S,F	8/27/2002	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
	Raritan River (S/Br.) – Unnamed Tributaries															
8	Trib. (Long Valley)	MR	P		0.83	-	TP	X				-	7/17/1996	SS	GEN	
8	Trib. (S. of Hoffmans)	HT	S		0.86	-	TP	X				-	7/18/1996	SS	GEN	
8	Trib. (S. of Schooleys Mtn.)	MR			0.62	-	TP	X				-	7/17/1996	SS	GEN	
8	Rhinehart Brook	MR	P,S		1.85	-	TP	X	X			-	7/11/1996	SS	WTS	
10	Rock Brook	ME	P			-	NT					S		S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Rockaway Creek (N/Br.)															
8	source downstream to Rt 523 bridge	HT	P,M		10.09	-	TP	X	X			-	8/12/1981	SS	WTS	
8	Rt 523 bridge to	HT	P		1.37	-	TM					-		S-CT		

					Waterbody Size			Reproducing Trout Species								
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
	confluence with Rockaway Ck S/Br															
8	Rockaway Creek (S/Br.)															
8	source downstream to Clinton Twp boundary	HT	P		2.58	-	TP		X			S	8/1/2002	SS, S-CT	GEN	Currently classified as trout maintenance recent sampling documented young of the year brown trout from the source of the creek to Clinton Twp boundary.
8	Clinton Twp boundary to confluence with N/Br Rockaway Creek	HT	P,M		2.66	-	TM					S	8/1/2002	S-CT	GEN	
8	Rockaway Creek	HT	P,M			-	NT					S	7/15/1969	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Rocky Run	HT	P		2.86	-	TP	X				-	7/14/1995	SS	GEN	
9	Roosevelt Park Pond	MI	C	FS	-	10	NT					S,F	10/19/1977	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
10	Rosedale Lake	ME	C	FS	-	30	NT					S,F	9/5/1996	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Round Valley Reservoir	HT	S	PS,BR	-	2350	TP				X	S	11/1/2002	SS, YR-CT	TTL	
9	Seeleys Pond	UN	C	PS,BR	-	3	NT					S		S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Sidney Brook	HT	P			-	NT					S	8/1/1991	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
9	Spooky Brook Park Pond	SO	C	FS	-	13	NT					S	5/17/1970	S-CT	GEN	
8	Spruce Run	HT	P		8.37	-	TP	X	X			S	8/20/1996	SS,YR-CT	GEN	
8	Spruce Run Reservoir	HT	S	PS,BR	-	1290	TM					S	10/23/1997	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Stony Brook	MR	P		3.14	-	TP	X	X			-	9/1/1998	SS	WTS	

					Waterbody Size			Reproducing Trout Species								
WR	**Waterbody**	**County**	**Owner**	**Access**	**Miles**	**Acres**	**Trout Class**	**Bkt**	**Bnt**	**Rbt**	**Lkt**	**Trout Stocked (S/F/W)**	**Year Last Sampled**	**Coldwater Mgmt Objective**	**Trout Regulations (yr adopted)**	**Comments**
10	Stony Brook	ME	P			-	NT					S	10/19/1973	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Sun Valley Brook	MR	P,M	None	1.22	-	TP	X				-	9/18/1970	SS	GEN	
	Sydney Brook – see Sidney Brook															
8	Teetertown Brook	HT	P		1.84	-	TP	X				-	8/17/81	SS		
9	Topenemus Lake	MO	C	PS,BR	-	21	NT					S,W	8/28/1979	S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Trout Brook	MR	P,S		1.5	-	TP	X				-	7/17/2002	SS	WTS	
8	Turkey Brook	MR	P		2.82	-	TP	X				-	8/10/2001	SS	WTS	
8	Walnut Brook	HT			3.73	-	TM					-	8/20/1982	-	GEN	
7	Warinanco Park Pond	UN	C	PS,BR	-	8	NT					S		S-CT	GEN	Seasonal trout fishery. Elevated summer water temperatures do not support holdover trout.
8	Wilhoughby Brook	HT	P		3.39	-	TP	X				-	8/7/2001	SS	WTS	

Water Region: Upper Delaware

					Waterbody Size		Trout	Reproducing Trout Species				Trout		Coldwater	Trout	
WR	**Waterbody**	**County**	**Owner**	**Access**	**Miles**	**Acres**	**Class**	**Bkt**	**Bnt**	**Rbt**	**Lkt**	**Stocked (S/F/W)**	**Year Last Sampled**	**Mgmt Objective**	**Regulations (yr adopted)**	**Comments**
11	Alexauken Creek	HT	P		4.68		TM						6/24/1970		GEN	
1	Allamuchy Creek	WA	S,P				NT						7/22/1970		GEN	
1	Alms House Brook															
	(Hampton)	SU	C,P		1.24		TM						8/14/1970		GEN	
	(Frankford)	SU	C,P				NT						8/14/1970		GEN	
1	Alms House Pond a.k.a. County Farm Pond	SU	C				NT					S		S-CT	GEN	
1	Andover Junction Brook	SU	P		3.6		TM					S	8/24/1998	YR-CT	GEN	
11	Assunpink Creek	MN/ME	S,C,P				NT					S	8/25/1998	S-CT	GEN	
1	Barkers Mill Brook	WA	P		1.26		TP	X				S	9/11/1991	SS YR-CT	GEN	
1	Bear Brook	WA	P		4.13		TP	X				SS	7/21/1970	SS	WTS	
1	Bear Creek	WA	P		5.59		TM					S	7/10/1996	SS	WTS	
1	Beatty's Brook	HT	C,P		1.74		TP	X	X			S	8/14/2001	SS	GEN	
1	Beaver Brook	WA	S,P				NT								GEN	
1	Beaver Brook (Hope)	WA	S,P				NT					S		S-CT	GEN	
1	Beaver Brook (Jefferson)	MR	S,P				NT								GEN	
2	Beaver Run	SU	P				NT						7/29/1970		GEN	
1	Beerskill	SU	S,P		3.22		TP	X				S	8/10/2004	SS YR-CT	GEN	
1	Bierskill – see Beerskill														GEN	
1	Big Flat Brook – see Flat Brook															
2	Black Creek															
2	Source downstream to Rt. 94 bridge	SU	P		2.46		TM						7/29/1970		GEN	
2	Rt. 94 bridge downstream to	SU	P										No Record		GEN	
2	Black Creek Tributaries		P													
2	Trib. (McAfee)	SU	P		1.25		TP	X	X				7/26/2005	SS	GEN	

WR	Waterbody	County	Owner	Access	Waterbody Size Miles	Waterbody Size Acres	Trout Class	Reproducing Trout Species Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
2	Trib. (Vernon Valley)	SU	P				NT								GEN	
1	Blair Creek															
	(Hardwick)	WA	P				NT						9/6/1989		GEN	
	(Hardwick center)	WA	P		3.24		TM					S	9/6/1989	YR-CT	GEN	
1	Blair Lake	WA	P			2						S		S-CT	GEN	
1	Blue Mountain Lake	SU	F			20						S	7/8/1981	S-CT	GEN	Anglers must walk in/portage watercraft
	Bowers Brook		P		0.61		TP	X						SS	GEN	
1	Brass Castle Creek	WA	C,P		3.87		TP	X	X			S	7/17/2001	SS YR-CT	GEN	
1	Brookaloo Swamp (Hope) – see Honey Run	WA			2.81		TM					S	7/8/1970	YR-CT	GEN	
1	Buckhorn Creek	WA	S,P		2.57		TP		X			S	7/16/2002	YR-CT	GEN	
1	Clearview Creek	SU	P				NT						8/27/1968		GEN	
1	Clove Brook (aka Mill Bk)	SU	F,S,P		7.2		TP	X	X						WTS	
2	Clove Brook	SU	P,M				NT								GEN	
2	Clove Brook (a.k.a. Clove River)	SU												S-CT	GEN	
	Jct. of Rt. 23 and Mt. Salem Road to Rt. 565		P												GEN	
2	Clove Creek	SU	P		6.16		TM						9/10/1968		GEN	
2	Clove River – see Clove Brook	SU													GEN	
2	Clove River	SU	P		6.29		TM								GEN	
11	Colonial Lake	ME	M			10						S/F		S-CT	GEN	
1	Columbia Lake	WA	S	BR		55						S	8/28/1990	S-CT	GEN	
1	Cranberry Lake	SU	S	BR		179	TM					S	5/20/2002	S-CT	GEN	
1	Cranberry Lake Outlet Stream	SU	S,P				NT								GEN	
1	Culver's Creek	SU	S,P		2.96		TM					S	9/13/1968	YR-CT	GEN	
1	Culvers Lake	SU	P										4/28/1992		GEN	
1	Culvers Lake Brook – see Culver's Creek															

					Waterbody Size			Reproducing Trout Species								
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
1	Delawanna Creek	WA	S,P				TP		X				8/18/1998	SS	GEN	
11	Delaware - Raritan Feeder Canal	HT/ME	S									S		S-CT	GEN	
11	Delaware River - Unnamed Tributaries														GEN	
11	Trib.(Holland)	HT	P		2.45		TP		X					SS	GEN	
1	Trib. (Knowlton)	WA	P		1.45		TP		X					SS	GEN	
1	Dry Brook	SU	P,M				NT					S	7/23/1998	S-CT	GEN	
1	Dunnfield Creek	WA	S		3.79		TP	X	X				8/6/1970	SS	WTS	
11	Everittstown Brook - see Nishisakawick Creek														GEN	
11	Fiddlers Creek	ME	P		2.48		TM						8/21/1991		GEN	
1	Flat Brook															
1	Saw Mill Pond to 100 ft above Crigger Rd	SU	S				NT					S		S-CT	GEN	(No in-season closure)
1	100 ft above Crigger Rd to Parker Bk	SU	S				NT					S,F		YR-CT	TS-CI	
1	Parker Bk to Rt. 206	SU	S,P				TP	X	X			S,F		YR-CT	TS-CI	
1	Rt. 206 to, but not including Blewitt Tract	SU	S				TP	X	X			S,F		YR-CT	FFA	
1	Blewett Tract	SU	F				TP		X			S,F		YR-CT	FFA	
1	Downstream boundary of Blewitt T. to Roy bridge	SU	F,S				TM					S,F		YR-CT	FFA	
1	Roy bridge to Delaware River	SU	F,S				TM					S,F		YR-CT	TS-CI	
1	Forked Brook	SU	S				TP	X					8/22/1985	SS	GEN	
2	Franklin Pond Creek	SU	S,P		1.91		TP	X	X			S	8/31/1994	YR-CT	GEN	
11	Frenchtown Brook - see Nishisakawick Creek															
1	Furnace Brook	WA	S,C,P		1.34		TP		X			S	8/23/1990	SS YR-CT	GEN	
1	Furnace Lake	WA	C	BR		53						S/W	8/29/1952	S-CT	GEN	
1	Gardners Lake	SU	S				TM						8/29/1952		GEN	
2	Glenwood Brook	SU	P		3.23		TM					S	8/6/1998	YR-CT	GEN	

WR	Waterbody	County	Owner	Access	Waterbody Size Miles	Waterbody Size Acres	Trout Class	Reproducing Trout Species Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
11	Hakihokake Creek (Milford)	HT	P				TP		X			S	9/1/1988	YR-CT	GEN	
11	Hakihokake Creek (a.k.a. Milford Brook)	HT	P				NT							YR-CT	GEN	
11	Hakihokake Creek - Unnamed Tributaries		P												GEN	
11	Hakihokake Creek (trib.)(Wydner)	HT	P		2.63		TP		X			S		YR-CT	GEN	
1	Halfway House Brook	WA			1.78		TP	X					9/6/1989	SS	GEN	
2	Hamburg Creek															
	(Hamburg Mts.)	SU	S,P		1.06		TM						8/6/1998		GEN	
	(Hardistonville)	SU	S,P				NT						8/6/1998		GEN	
1	Hances Brook	WA	S,P		1.82		TP	X					8/5/1970	SS	WTS	
2	Hanford Brook	SU	P				NT						6/18/1970		GEN	
11	Harihokake Creek															
	(Frenchtown)	HT	P		3.41		TM								GEN	
	(Alexandria)	HT	P				NT								GEN	
1	Hatchery Brook – see Trout Brook				3.11		TM								GEN	
1	Honey Run	WA	P		4.73		TM					S	7/8/1970	YR-CT	GEN	
1	Independence Creek	WA	P				TM/NT						8/1/1991		GEN	
1	Jacksonburg Creek	WA	P		6.27		TM					S	7/10/1970	YR-CT	GEN	
11	Jacobs Creek	ME	P												GEN	
1	Knowlton Brook	WA	P		3.42		TP	X						SS	GEN	
1	Kurtenbach's Brook	MR	S,P		0.61		TP	X						SS	GEN	
1	Kymer Brook	SU	P				NT						8/26/1970		GEN	
1	Lake Aeroflex	SU	S	BR		101	TM					S/W	9/25/1995	YR-CT	HTL	
1	Lake Hopatcong	SU	S	BR,PS		2,685	TM					S		S-CT	GEN	Trout allocation based on YR strategy
1	Lake Illif	SU	M			37	TM								GEN	
1	Lake Marcia	SU	S			19									GEN	
1	Lake Musconetcong	SU	S			329						S		S-CT	GEN	

WR	Waterbody	County	Owner	Access	Waterbody Size Miles	Waterbody Size Acres	Trout Class	Reproducing Trout Species Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
1	Lake Ocquittunk	SU	S,W			8						S/W		S-CT	GEN	
2	Lake Rutherford	SU	P				TM							S-CT	GEN	
1	Little Flat Brook	SU	S,P		10.42		TP		X			S	8/18/1988	YR-CT	GEN	
1	Little Swartswood Lake	SU	S,W			75	NT					S/W		S-CT	GEN	
11	Little York Brook	HT	P		3.28		TP	X					8/7/2001	SS	WTS	
2	Livingston Ponds Brook	SU	P		2.36		TP	X	X				7/26/1990	SS	GEN	
11	Lockatong Creek	HT	M,P		4.39		TM					S		YR-CT	GEN	
1	Lommasons Glen Brook	WA	P		1.61		TP	X						SS	GEN	
2	Longhouse Brook	SU	P				NT								GEN	
1	Lopatcong Creek															
		WA	C,P		5.62		TP	X	X			S		Y-CT	GEN	
		WA	C,P		2.65		TM					S		Y-CT	GEN	
1	Lopatcong Creek - Unnamed Tributaries															
1	Trib.(Uniontown)	WA			1.23		TP	X						SS	GEN	
2	Lounsberry Hollow Brook	SU			3.75		TM						8/13/1970		GEN	
1	Lubbers Run	SU			5.49		TM					S	8/21/2001	YR-CT	GEN	
1	Merrill Creek	WA	P				TP	X					8/1/1984	SS	WTS	
1	Merrill Creek Reservoir	WA	P	BR		650	TM					S		YR-CT	TTL	Ice fishing not allowed
1	Mill Brook	WA	S,P		2.78		TP							SS	GEN	
1	Mine Brook - Unnamed Tributaries															
1	Trib. (Drakestown)	MR	P				TP	X						SS	GEN	
1	Trib. (Washington)	MR	P				TP	X					8/18/1989	SS	GEN	
11	Moore Creek (Hopewell)	ME	P		4.26		TM						8/31/1972		GEN	
1	Mountain Lake (Liberty)	WA	S	BR,PS		122	TM					S	6/16/2000	YR-CT	GEN	Boat ramp is private
1	Mountain Lake Brook (Liberty)	WA	P		1.99		TM						8/21/1990		GEN	
1	Muddy Brook – see Honey Run	WA					TM					S	7/19/1988	YR-CT	GEN	
	Mud Pond Outlet Stream	SU			2.86		TP							SS	GEN	

					Waterbody Size			Reproducing Trout Species								
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
1	Musconetcong River (Hackettstown)	SU,MR	S,P		38.22		TM					S		YR-CT	STCA	Section of it is STCA & float stocked
1	Musconetcong River - Unnamed Tributaries															
1	Trib. (Anderson)	WA			2.23		TP	X						SS	GEN	
1	Trib. (Changewater)	WA			3.11		TP	X						SS	GEN	
1	Trib. (Deer Park Pond)	WA			0.69		TM	X					8/6/1987	SS	GEN	
1	Trib. (Franklin)	WA			2.27		TP	X						SS	GEN	
1	Trib. (Lebanon)	HT			1.6		TP	X						SS	GEN	
1	Trib. (Port Murray)	WA			2.47		TP	X						SS	GEN	
1	Trib. (S. of Schooley Mtn.)	MR			0.76		TP	X	X					SS	GEN	
1	Trib. (Waterloo)						TP	X						SS	GEN	
	Trib. (North of Hackettstown)	WA			1.33		TM								GEN	
1	Neldon Brook – see Swartswood Creek	SU			2.13		TM					S	7/45/81	YR-CT	GEN	
1	New Wawayanda Lake - see Lake Aeroflex					101	TM					S	8/15/2001	YR-CT	HTL	
11	Nishisakawick Creek (aka Frenchtown Bk)	HT	P				NT					S	7/20/1990	S-CT	GEN	
2	Papakating Creek	SU	P		3.13		TM						8/11/1970		GEN	
2	Papakating Creek (W/Br.)(Wantage)	SU	P				NT					S	9/18/1968	S-CT	GEN	
1	Parker Brook (Montague)	SU	S		3.68		TP	X					8/27/1968	SS	WTS	
1	Paulina Creek	WA	P		1.23		TM						7/26/1994		GEN	
	Paulins Kill (Blairstown)	WA	S,P		19.48		TM								GEN	2 sections float-stocked
1	Paulins Kill - Unnamed Tributaries															
1	Trib. (E. of Walnut Valley)	WA	P		2.56		TM								GEN	
1	Trib. (Emmons Sta.)	SU	P		2.31		TP		X					SS	GEN	
1	Trib. (Stillwater Sta.) (a.k.a. Roy Spring Bk)	SU	P		2.37		TP		X			S		SS YR-CT	GEN	
1	Trib. (Stillwater)		P		1.2		TM								GEN	

WR	Waterbody	County	Owner	Access	Waterbody Size Miles	Waterbody Size Acres	Trout Class	Reproducing Trout Species Bkt	Reproducing Trout Species Bnt	Reproducing Trout Species Rbt	Reproducing Trout Species Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
1	Paulins Kill (E/Br.)	SU	S,P		2.49		TP			X		S		YR-CT	YTCA	Section of it is YTCA
1	Paulins Kill (E/Br.) - Unnamed Tributaries															
1	Trib. (Sussex Mills)	SU	P				NT								GEN	
1	Paulins Kill (W/Br.)	SU	P				TM					S		YR-CT	GEN	
1	Paulins Kill Lake	SU	P			157	TM						6/26/1951		GEN	
1	Pequest River		S,P		5.63		TM					S,F		YR-CT	GEN,STCA	Section of it is YTCA
1	Pequest River - Unnamed Tributaries															
1	Trib. (Petersburg)	WA	P		0.67		TP	X						SS	GEN	
	Trib. (Janes Chapel)		S,P		1.88		TM								GEN	
11	Plum Brook	HT	P		5.02		TM						7/2/1970		GEN	
2	Pochuck Creek	SU	S,P				NT								GEN	
1	Pohatcong Creek															
	Source to Rt. 31	WA	S,P		12.87		TM					S		YR-CT	GEN	
	Rt. 31 to Delaware River	WA	P		4.25		TP/TM					S,F		YR-CT	TS-CI	
1	Pohatcong Creek - Unnamed Tributaries															
1	Trib. (Greenwich)	WA	P		1.52		TP	X	X				7/16/1987	SS	GEN	
1	Trib. (New Village)	WA	P		1.76		TP	X					9/4/1986	SS	GEN	
1	Trib. (Willow Grove)	WA	P		1.34		TP	X					7/6/1987	SS	GEN	
1	Pond Brook (Middleville)	SU	S,P				NT					S	8/8/1968	S-CT	GEN	
1	Pophandusing Creek (Belvidere)	WA	P		2		TM					S	7/11/1990	YR-CT	GEN	
1	Pophandusing Creek (Hazen/Belvidere)	WA	P		1.89		TP		X				7/11/1990	SS	GEN	
1	Roaring Rock Brook – see Brass Castle Creek	WA			3.87		TP	X	X			S	7/17/2001	SS YR-CT	GEN	
1	Roy Spring Brook – see Paulins Kill (trib.)(Stillwater Sta.)				2.37		TP		X						GEN	
1	Sandyston Creek (Sandyston)	SU	F		1.53		TP						8/4/1970	SS	GEN	
1	Sawmill Pond (a.k.a. Saw	SU	S			20	NT						9/15/1971		GEN	

					Waterbody Size			Reproducing Trout Species								
WR	**Waterbody**	**County**	**Owner**	**Access**	**Miles**	**Acres**	**Trout Class**	**Bkt**	**Bnt**	**Rbt**	**Lkt**	**Trout Stocked (S/F/W)**	**Year Last Sampled**	**Coldwater Mgmt Objective**	**Trout Regulations (yr adopted)**	**Comments**
	Mill Lake)															
2	Sawmill Pond Brook	SU	S				NT					S	7/31/1985	S-CT	GEN	
1	Schooley's Mtn. Brook	MR	P		2.03		TP	X					8/5/1970	SS	GEN	
	Shabbecong Creek		P		3.63		TM									
1	Shawanni Creek	SU	F		1.41		TP	X					8/11/1970	SS	GEN	
1	Shimers Brook	SU	F,P		3.79		TP	X	X				8/27/1996	SS	GEN	
2	Silver Lake (Hamburg Mtn. WMA)	SU	S	BR			TM					S/W		S-CT	GEN	
1	Silver Lake (Hope)	WA	P				TM						7/15/1978		GEN	
2	Sparta Glen Brook	SU	M,P		2.84		TP	X					7/31/1990	SS	GEN	
1	Sparta Junction Brook	SU	P		2.29		TM						7/23/1970		GEN	
2	Spring Brook	HT	P				TP	X					5/20/1982	SS	GEN	
	Spring Brook	SU	P		2.41		TP	X						SS	GEN	
11	Spring Mills Brook															
	(Milford)	HT					TP					S	8/7/2001	SS	GEN	
	(Spring mills)	HT			4.2		TP		X			S	8/7/2001	YR-CT	GEN	
1	Stephensburg Creek	MR	S,P		1.79		TP	X					8/5/1970	SS	WTS	
1	Stony Brook (Knowlton)	WA	F,P		4.38		TP	X	X				9/1/1998	SS	GEN	
1	Stony Brook (Stokes S.F.)	SU	S		1.2		TP	X						SS	WTS	
1	Stony Lake (Stokes S.F.)	SU	S	NB		15	TM					S	9/10/1971	S-CT	GEN	
11	Swan Creek	ME	P				NT						8/10/1970		GEN	
1	Swartswood Creek (aka Neldon Bk)	SU	S,P		2.13		TM					S	7/10/1970	YR-CT	GEN	
1	Swartswood Lake	SU	S	BR		494	TM					S	10/18/2001	YR-CT	HTL	Float stocked (P&F)
1	Tar Hill Brook		P													
	(Source- Lake Lenape)	SU			2.08		TM						8/27/1970		GEN	
	(Lake Lenape- And. Junct. Brook)	SU					NT						8/27/1970		GEN	
1	Tillman Brook	SU	S		2.54		TP	X					8/11/1970	SS	GEN	

					Waterbody Size			Reproducing Trout Species								
WR	Waterbody	County	Owner	Access	Miles	Acres	Trout Class	Bkt	Bnt	Rbt	Lkt	Trout Stocked (S/F/W)	Year Last Sampled	Coldwater Mgmt Objective	Trout Regulations (yr adopted)	Comments
2	Town Brook	SU	P		3.67		TM						8/30/1990		GEN	
1	Trout Brook (Allamuchy)	WA	P				NT						7/22/1970		GEN	
1	Trout Brook (Hackettstown)	WA	S,P												GEN	
1	Trout Brook (Hope)	WA	S,P		5.11		TM					S	7/10/1996	YR-CT	GEN	
1	Trout Brook (Middleville)															
	(Source- Pond Brook)	SU	P		4.74		TP	X						SS	GEN	
	(Pond Brook-Paulins Kill	SU	P				NT								GEN	
1	Trout Brook (Tranquility)	WA	P		3.01		TP	X						SS	GEN	
	Tunnel Brook	WA	P		1.7		TP	X						SS		
1	Turkey Hill Brook	HT	P		3		TP		X					SS	WTS	
1	Tuttles Corner Brook	SU	S		2.46		TP	X				S	8/4/1970	SS YR-CT	GEN	
1	Van Campens Brook	SU	F		7.74		TP	X	X	X			8/30/1984	SS	WTS	
2	Wallkill River	SU	F,P				TM/NT					S,F		YR/S-CT	GEN	
2	Wallkill River - Unnamed Tributaries															
2	Trib. (Ogdensburg)	SU	P		1.12		TP	X						SS	GEN	
2	Trib. (Sparta)	SU	P		1.1		TP	X						SS	GEN	
2	Wantage Brook	SU	P				NT						8/25/1970		GEN	
	Warford Creek		P		3.4											
2	Wawayanda Creek	SU	S,P				TM					S	8/30/1990	YR-CT	GEN	
2	Wawayanda Creek - Unnamed Tributaries		S													
2	Trib. (Wawayanda)	SU					NT								GEN	
2	Wawayanda Lake	SU	S	BR		255	TM					S		YR-CT	HTL	Float stocked (P&F)
1	Weldon Brook	MR	S,P		2.69		TM						9/9/1987		GEN	
1	West Portal Brook	HU	P		3.41		TP	X	X				7/8/2002	SS	GEN	
1	White Brook	SU	F		1.93		TP	X					6/18/1970	SS	GEN	
1	White Lake (Sussex Co.)	SU	P				TM								GEN	

					Waterbody Size			Reproducing Trout Species								
WR	**Waterbody**	**County**	**Owner**	**Access**	**Miles**	**Acres**	**Trout Class**	**Bkt**	**Bnt**	**Rbt**	**Lkt**	**Trout Stocked (S/F/W)**	**Year Last Sampled**	**Coldwater Mgmt Objective**	**Trout Regulations (yr adopted)**	**Comments**
1	White Lake (Warren Co.)	WA	C			65	TM					S		YR-CT	HTL	
11	Wichecheoke Creek															
11	Confluence with Plum Brook	HT	P		4.24		TM						7/2/1970		GEN	
11	Source downstream to confluence with Plum Brook	HT	P				NT						6/24/1970		GEN	
11	Covered Bridge (Rt. 604), Sergentsville, to	HT	P										7/28/1977		GEN	
2	Wildcat Brook	SU	P				NT						8/31/1994		GEN	
2	Willow Brook (aka Quarryville Bk)	SU	P		3.98		TM						8/31/1994		GEN	
1	Wills Brook	MR	P		3.01		TM						9/4/1970		GEN	
1	Yards Creek	SU	P		2		TP		X				7/18/2002	SS	GEN	

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