

Strategic Plan for Management of Trout Fisheries in Pennsylvania 2010 - 2014

Bureau of Fisheries
Pennsylvania Fish and Boat Commission
October 2009



Acknowledgments

The Pennsylvania Fish and Boat Commission would like to thank the following individuals for their dedication, cooperation and insight in assisting with the development of this plan:

Commissioner Robert Bachman, Commissioner Thomas Shetterly, Commissioner William Sabatose, Commissioner William Worobec, Rocco Ali, Mike Bleech, Dr. Robert Carline, Rick Carlson, Phil Ewaka, Carl Fox, Kirk Fox, Jim Gallagher, Don Jacobs, John T. Lee, Edward Martin, William Miller, Dan Pfeilstucker, Dan Schoonover, Sr., Sam Sleigh, Ken Undercoffer, Herbert Weigl, Jr., Ray Werts, Fred Bohls, Stan Kabata, Don Anderson, Laurel Anders, Dr. Douglas Austen, Scott Carney, Tom Cochran, Jason Detar, Aaron Frey, Tom Greene, Tom Kamerzel, Mike Kaufmann, Cindy Kellander, Rick Lorson, Adrian Martin, Dave Miko, Tim Schaeffer, Dave Spotts, Bob Weber, Rob Wnuk and Leroy Young.

Table of Contents

	Page
Chapter 1: Introduction	6
Purpose of the Strategic Plan for the Management of Trout Fisheries in Pennsylvania.....	8
A Vision for Trout Management in Pennsylvania	9
Goal of this Strategic Plan	9
Chapter 2: Defining Pennsylvania’s Trout Resources and Trout Anglers.....	11
Description of the Resource and Resource Users	11
Description of Pennsylvania’s Trout Anglers	15
Classification of Wild Trout Streams	18
Significance of PFBC Trout Water Classification to Resource Protection.....	22
Chapter 3: Management of Wild Trout Waters	25
Goals.....	26
Stressors and Threats	26
Opportunities	28
Strategies	32
Chapter 4: Management of Streams with Trout Fisheries Maintained by Stocking.....	37
Trout Hatcheries	38
Hatchery Operations.....	41
Current Species, Size and Numbers Produced	41
Cost.....	41
Goals.....	42
Stressors and Threats.....	42
Opportunities	43
Strategies	44

Chapter 5: Lakes Managed for Trout.....	49
Goals.....	51
Stressors and Threats.....	51
Opportunities.....	51
Strategies.....	53
 Chapter 6: Trout Management in Lake Erie.....	 55
Goals.....	57
Stressors and Threats.....	57
Opportunities.....	58
Strategies.....	58
 Literature Cited.....	 60
 Appendix A: Summary of Issue Statements.....	 61

List of Tables

	Page
Table 1. Criteria used to determine the classification of biomass Class A, B, C, D, and E	19
Table 2. Frequency of Class B, C, and D stream sections managed under various management strategies	22
Table 3. Effect of PFBC trout biomass classification system on SRBC water withdrawal permitting.....	23
Table 4. Number of stream sections and miles managed under special regulations and statewide regulations.....	26
Table 5. Annual adult trout production goals	39
Table 6. Annual put-grow-take and cooperative nursery fingerling production goals	39
Table 7. Number of adult trout stocked lakes by Lake Class	49
Table 8. Pennsylvania lakes managed as two-story fisheries	50

List of Figures

	Page
Figure 1. Miles of stream managed for trout	11
Figure 2. Statewide distribution of lakes managed for trout fishing in Pennsylvania	14
Figure 3. Trout angler participation (Days)	16
Figure 4. Distance traveled one-way to fish for trout	17
Figure 5. Statewide distribution of Class A Wild Trout Streams	20
Figure 6. Statewide distribution of biomass Class B, C and D streams.....	21
Figure 7. Statewide distribution of biomass Class E streams	37
Figure 8. Total (PFBC + Sportsman’s Cooperative Nurseries) steelhead stocking by location in 2008.....	57

CHAPTER 1

INTRODUCTION

Pennsylvania's angling history spans a period of over two centuries. This extends from a time predating the Pennsylvania Fish and Boat Commission (PFBC), when angling opportunities were solely dependent upon native stocks and where laws and regulations were virtually absent. Present day management includes angling regulations and law enforcement, water quality protection, habitat enhancement, management directed at protecting naturally reproducing stocks, and the use of cultured fish to provide recreational angling opportunities. Over this time period, a variety of changes have occurred that coincided with the evolution of angling methods and management practices. These changes are discussed in "The History of Trout Management in Pennsylvania" (Weber et al. 2008).

Beginning in 1983, the PFBC incorporated a "Resource First" philosophy into the management of the Commonwealth's coldwater resources. Under this concept, statewide management was implemented and decisions were made on individual waters based on resource classification. Resource classification took into consideration key biological, physical, and social factors when assigning waters to an appropriate resource category.

As part of the change to resource classification based management, the presence and abundance of wild trout were recognized. Trout population abundance criteria were developed to identify and categorize wild trout waters and provide the framework for the formal management of wild trout populations with no stocking. For lakes and streams that required the stocking of adult trout to provide angling opportunities, a set of biological, physical, and social factors were used to assign waters to an appropriate resource based stocking category. Waters with similar attributes were assigned to the same stocking category.

The "Resource First" philosophy was a striking change from past practice. Formerly, trout management was based on allocating trout on the basis of a county quota system where license sales were the primary basis for determining the number of hatchery trout assigned to a county, regardless of the water resources available in the county. Wild trout management was limited to very remote streams under this system.

In April 2008 the Commissioners approved a new “Resource First” policy that stated that, “Resource First is a philosophy that describes the first priority of the PFBC’s mission and that of the Fish and Boat Code as well as the PFBC’s fundamental role in fulfilling and supporting the provisions of Article 1, Section 27 (Natural Resources and Public Estate) of the Constitution of the Commonwealth of Pennsylvania.

It represents:

1. The commissioners’ belief that the Commonwealth’s aquatic resources are the valuable collateral that secures all fishing and boating activities.
2. The notion that protecting, conserving, and enhancing the Commonwealth’s aquatic resources is the agency’s first management priority.
3. The commissioners’ expectation that the agency’s activities, regulations, and methods of work will be evaluated and practiced within the context of this priority.

This philosophy is expected to:

1. Provide the basis for scientifically managing and protecting the Commonwealth’s aquatic resources and maximizing fishing and boating opportunities.
2. Lead to different ways of allocating the agency’s limited financial resources.
3. Support new, scientifically-based approaches to distributing and raising expensive, stocked fish.
4. Provide the basis for protecting and enhancing viable wild fisheries and other resources under the agency’s jurisdiction.

The “Resource First” philosophy further establishes the ethical principle that the agency’s primary role is that of a conservation organization. Accordingly, its responsibility extends beyond merely providing fishing and boating opportunities to the public. Rather, it establishes a commitment to optimizing those opportunities through the application of good science throughout the Commonwealth. It also establishes the firm expectation that the agency will:

1. Not engage in or support activities or regulations that may bring undue harm to its aquatic resources.

2. Constantly strive to develop and improve upon its ability to make scientifically-informed decisions on the impact of various regulations and practices on the aquatic resources it is charged to protect.

Should doubt or confusion arise regarding this priority, the agency will:

1. Opt for the more conservative position of protecting, conserving, and enhancing the water, the habitat within its attendant watershed, and the life within it.
2. Develop all of its activities in a scientifically supportable manner that is consistent with this philosophy and the most currently available research.
3. Implement changes, whenever feasible, in its regulations and practices to eliminate such doubt or confusion.” It is this policy that describes the foundation of this strategic trout management plan.

In the time period since the publication of the “Third Edition of the Management of Trout Fisheries in Pennsylvania Waters” (November 1997), a number of evaluations have been conducted to enable staff to refine trout management in the waters of the Commonwealth. These evaluations have included the following: a statewide angler use and harvest assessment of trout stocked lakes in 2000 and 2001; a Trout Summit involving PFBC staff and invited members of the angling public in 2002; a statewide angler use and harvest survey and economic assessment of wild trout streams in 2004; a statewide angler use and harvest survey and economic assessment of stocked trout streams in 2005; assessments of opening weekend angler use and cost-benefit of stocking on trout stocked streams in 2006, 2007, 2008 and 2009; statewide assessments of stocked trout residency in streams prior to the opening day of trout season in 2006, 2007, 2008 and 2009; a statewide Trout Angler Telephone Survey to assess angler attitudes and opinions in 2008; annual stream and lake examination inventories; evaluations of existing trout management program options; and a comprehensive economic analysis of the costs to produce hatchery trout for put-grow-take fisheries, cooperative nurseries, and put-and-take catchable adult trout fisheries.

Purpose of the Strategic Plan for the Management of Trout Fisheries in Pennsylvania

The purpose of this strategic plan is to identify the goals for trout management in Pennsylvania and develop action steps to achieve them. It is designed to set the immediate

direction of trout management within the agency, identify the priority needs and provide a means for measuring progress in regard to trout management.

The current plan is a major revision of the 1997 edition. It incorporates the information collected from the evaluations mentioned above to outline the current status of the existing management program. It then details areas for improvement in the current program and identifies new opportunities as determined by staff and the public. Strategies are then proposed to address these areas of needed improvement

The management of Pennsylvania's trout fisheries continues to evolve as the PFBC moves forward to meet the challenges of the new millennium. As such, the plan is dynamic, and as the need for revision arises, the plan will be modified accordingly. This document should be considered as a five-year plan. Program evaluation will include annual progress reports. An overall plan review and update will be conducted in 2014.

A Vision for Trout Management in Pennsylvania

The “Policy for Conservation and Fisheries Management in Pennsylvania” must be interpreted as it applies to the many fisheries management programs of the PFBC. The subject of the current document is trout management. PFBC staff, in cooperation with a 37 member Trout Work Group comprised of staff, Commissioners, and anglers, have developed the following Vision statement to guide the development of the current plan in light of PFBC policy:

The vision of the PFBC for trout management is to manage Pennsylvania’s wild and stocked trout fisheries through the protection, conservation and enhancement of these fisheries and to provide high quality, diverse angling opportunities for trout.”

Goal of this Strategic Plan

The goal of this strategic plan is to identify specific, attainable and measurable action items for the PFBC to implement during the next five years to address the Vision. Specific action items and the strategies that will be used to enable the PFBC to meet its goal are detailed within specific resource classes throughout the remainder of this plan.

Through the development of this plan, 24 issues have been identified as priorities by PFBC staff, Commissioners, and a 37 member Trout Work Group. Addressing these issues will be the focus of the PFBC trout management program during the next five years. A summary of these issues is provided in Appendix A. Under each of the resource category chapters of the plan, measurable and time-bound strategies have been developed. Significant progress in addressing these issues over the life of this plan will insure that adequate protection is being afforded to our wild trout resources, and that the fisheries provided through the management of wild trout and the efficient propagation and stocking of adult and fingerling trout will provide excellent angling opportunities for trout in Pennsylvania.

CHAPTER 2

DEFINING PENNSYLVANIA'S TROUT RESOURCES AND TROUT ANGLERS

Description of the Resource and Resource Users

Pennsylvania is fortunate to have a vast flowing water resource comprised of 86,000 miles of flowing water (Pa. DEP 2006). To date, the PFBC has surveyed, 3,175 streams comprising 21,654 miles. Of this total, there have been 1,709 streams (9,372 miles) in which wild trout have been documented by PFBC staff. There are another 1,702 streams, comprising 3,305 miles, that by PFBC policy are classified as wild trout streams by virtue of the fact they lie upstream of documented wild trout waters (58 Pa. Code §57.11; Figure 1). This results in a total of 3,411 designated wild trout streams comprising 12,824 miles. Including stocked streams, there are currently 15,118 miles of streams managed to provide trout fishing in Pennsylvania.

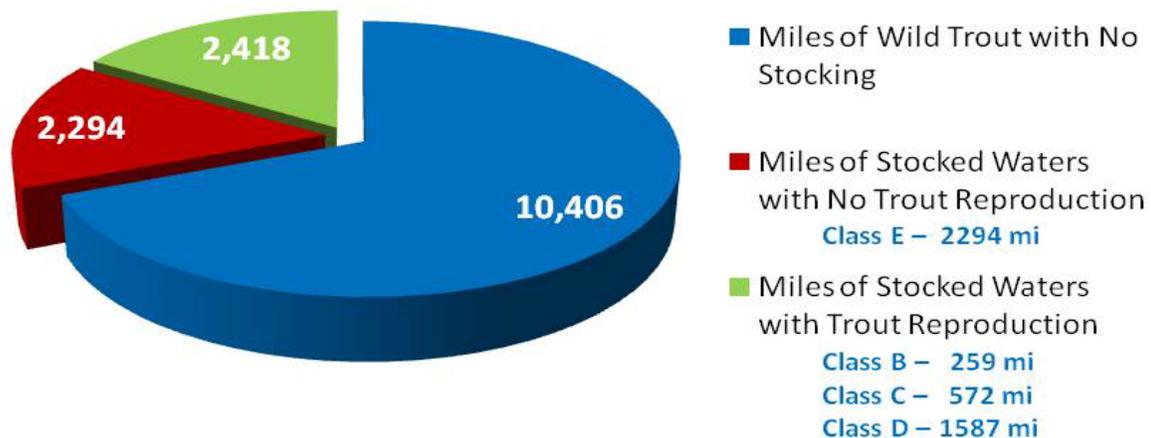


Figure 1. Miles of stream managed for trout.

Pennsylvania's diverse coldwater resources range from small, infertile mountain streams to larger valley limestone streams. Reproducing populations of brook trout, brown trout, and to a lesser extent rainbow trout, have been documented in these waters. Brook trout are the only trout species native to Pennsylvania's streams and it is Pennsylvania's official state fish. Despite the numerous changes that have occurred to Pennsylvania's landscape since the pre-colonial era, brook trout continue to be broadly distributed across the state. Based on stream examination data collected by PFBC staff since 1976, wild brook trout populations have been documented in 1,524

stream sections covering a total of 5,044 stream miles. A stream section is a portion of a stream that carries a particular PFBC management strategy. It can be the entire stream length from headwaters to the mouth or a much smaller identified stream reach.

Brown trout were introduced to Pennsylvania's waters during the late 1800s. Brown trout have adapted well to Pennsylvania's streams and naturalized populations of wild brown trout have been documented in 1,276 stream sections covering a total of 4,917 stream miles. Rainbow trout were also introduced to Pennsylvania's waters during the late 1800s. Although this species has been regularly used as part of the statewide stocking program since the 1920s, wild rainbow trout populations have been documented in only 30 stream sections covering 83 stream miles. It should be noted that these figures provide a conservative estimate of the miles of streams inhabited by wild trout in Pennsylvania, as it includes only those waters where wild trout have been confirmed by way of PFBC stream surveys (PFBC 2007). An evaluation of the economic contribution to the Commonwealth resulting from angling activities that occur on wild trout streams was conducted in 2004. It was estimated that these activities result in a total economic contribution of 7.16 million dollars.

Trout stocked waters that do not support natural reproduction provide a significant amount of additional cold water angling opportunities in Pennsylvania. Currently, the PFBC stocks adult trout in a total of 530 stream sections covering 2,294 miles of stream that do not support natural reproduction. These waters comprise nearly half of the stream sections and miles of stream stocked with adult trout on an annual basis. Another 15 stream sections, totaling 146.7 miles, are stocked exclusively with fingerlings to provide put-grow-take fisheries. Fifteen stream sections totaling 65.9 miles are managed with both fingerlings and adult trout. An evaluation of the economic contribution to the Commonwealth resulting from angling activities that occur on stocked trout streams was conducted in 2005. It was estimated that these activities result in a total economic contribution of 65.70 million dollars.

Excluding Lake Erie, the PFBC manages 386 publicly accessible natural lakes and artificial impoundments for fishing opportunities. Currently, 1,103 stream sections, comprising 4,880 miles of flowing water, and 132 natural lakes and artificial impoundments, comprising

30,916 acres, are managed for salmonids through adult, fingerling or a combination of adult and fingerling trout stocking programs.

Forty-three miles of Lake Erie shoreline lie within Pennsylvania's borders, which provide a unique opportunity for trout management in Pennsylvania. The potential of this system to produce trophy fish is confirmed by the number of state record fish that have been produced there. Coho, chinook, steelhead, and brown trout have been stocked at various intensities in Pennsylvania's waters of Lake Erie since the 1960's. During the early stage of these programs, coho salmon were the primary focus (Buss, 1967). They were eventually phased out due to poor performance, especially relative to steelhead (Murray and Hoopes, 1999). Eventually, steelhead became the principal component of the put-grow-take trout management program. An economic evaluation of the steelhead program conducted in 2003 and 2004 estimated that the total economic contribution of the steelhead fishery to Pennsylvania's economy was 10.68 million dollars.

Of the 386 inland natural lakes and impoundments that provide free public access for fishing 132 are managed to provide recreational angling opportunities for trout through adult trout stocking, fingerling trout stocking or a combination of the two (Figure 2). These waters include both two-story and one-story lakes. Two-story lakes are those with a hypolimnion that is extensive enough, and has adequate temperatures and dissolved oxygen levels to provide year-round survival and angling opportunities for trout. This type of habitat is uncommon in Pennsylvania; there are currently 12 two-story lakes managed for trout in the state. These lakes receive either stockings of adult trout (2), fingerling trout (7) or a combination of adult and fingerling trout stockings (3). These lakes range in size from the 67 acre Laurel Creek Reservoir in Mifflin County to the 12,081 acre Allegheny Reservoir in Warren County (Figure 2).

One-story lakes are more common in Pennsylvania. These lakes are characterized by an epilimnion that extends to the lake bottom or a hypolimnion that is not extensive enough and that does not contain enough dissolved oxygen to support aquatic life throughout the summer when thermal stratification occurs. As a result, one-story lakes are only capable of supporting trout on a seasonal basis.

The PFBC manages 120 lakes with the stocking of adult trout. These lakes range in size from small ponds of less than 2 acres to larger impoundments approaching 250 acres. Adult trout stocking in lakes primarily occurs during the peak period of angling activity in the spring. However, some lakes are stocked during the fall and winter periods to extend angling opportunities over a greater portion of the year. Five of the adult trout stocked waters are two-story lakes; the majority are one-story lakes and do not provide adequate water temperatures and dissolved oxygen content to support trout on a year-round basis.

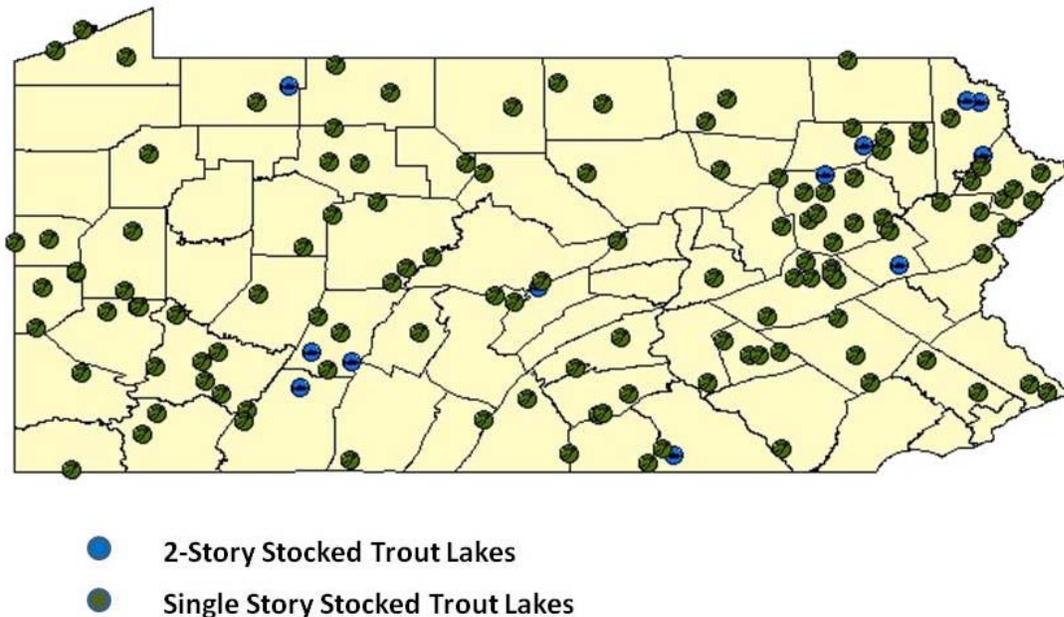


Figure 2. Statewide distribution of lakes managed for trout fishing in Pennsylvania.

Five of Pennsylvania's two-story lakes are in public ownership while seven have substantial private or municipal holdings. Three of the lakes are located in southwest Pennsylvania and four are located in northeast Pennsylvania. Two of the southwest lakes are county owned while the third is owned by a municipal water authority. Shoreline fishing is permitted at all three lakes. Additionally, each of the southwest lakes has a public boat ramp. In the northeast, numerous individual landowners control the shorelines of the four lakes and generally do not permit public shore access. Nevertheless, each of the northeast lakes has at least one public boat launch that receives high angler use.

Description of Pennsylvania's Trout Anglers

Trout angling generates a considerable amount of angler interest and represents a major component of the total fishery available in the Commonwealth. According to a 1991 Trout Angler Telephone Survey, 80% of Pennsylvania's licensed anglers fished for trout at some time during the season (Hummon 1992). During 2008 the PFBC sold 484,797 trout and salmon stamps. This represents the minimum number of anglers that fish for trout in Pennsylvania as the trout and salmon stamp sales do not take into account lifetime license holders who are not required to purchase a stamp annually nor does it take into consideration anglers under 16 years of age who are not required to purchase a license.

Information from Trout Angler Telephone Surveys conducted in 1991 and 2008 indicated that trout angling is a male-dominated activity as 91% of trout anglers were males in 2008, and 90% of the trout anglers were males in 1991 (Duda et al. 2008, Hummon 1992). Pennsylvania trout anglers are an aging group; the median age of anglers was 39 in 1991 and 46 in 2008. Several trends in angler behavior have been observed from 1991 to 2008. For example, anglers are releasing a greater portion of their catch. Seventy-five per cent of the anglers reported they released at least half of their catch in 1991, compared to 88% in 2008. In addition, based on the results from statewide angler use and harvest surveys conducted on wild trout streams in 2004 and stocked trout streams in 2005, anglers released over 92% and 63% of the trout caught, respectively (Greene et al. 2005; Greene et al. 2006). A substantial majority of Pennsylvania's trout anglers prefer to fish streams as compared to lakes. In 1991, 74% of the anglers preferred to fish for trout in streams, 13% preferred lakes and 13% had no preference between streams and lakes. Similarly, in 2008, 81% of Pennsylvania trout anglers preferred to fish streams, 10% preferred lakes and nine percent had no preference between lakes or streams.

The avidity level of Pennsylvania's trout anglers in 2008 varied significantly, with a cluster (21%) of anglers that typically fished for trout between one to five days each year and a cluster (20%) of anglers that fished for trout more than 30 days per year (Figure 3).

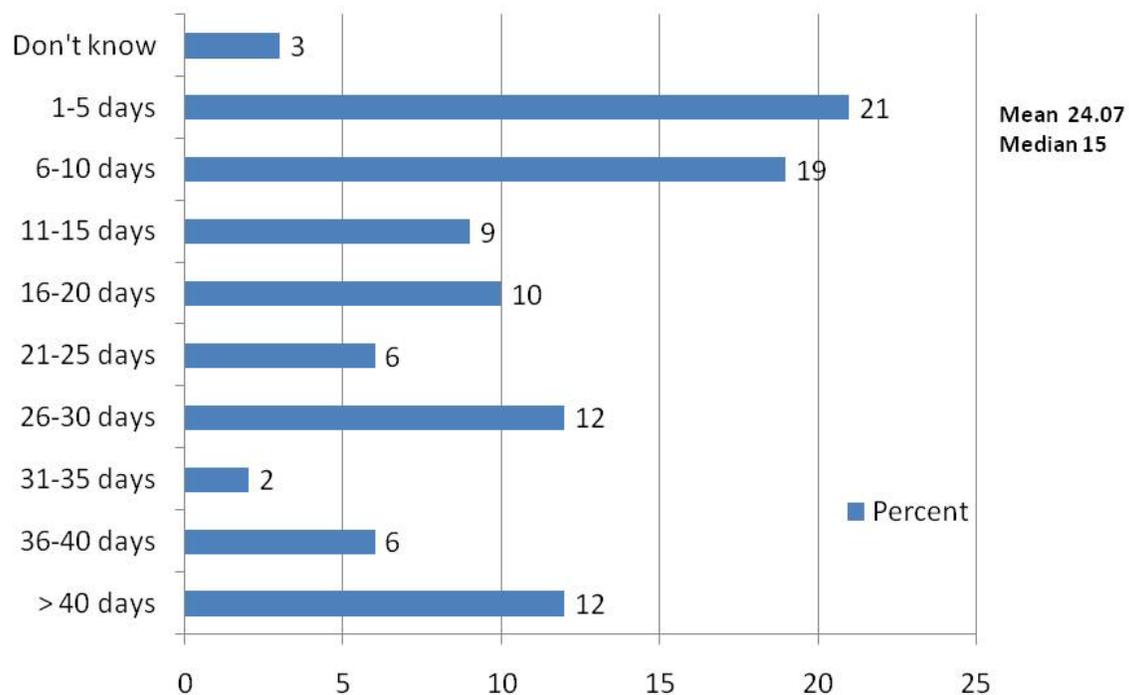


Figure 3. Trout angler participation (Days).

The distance traveled to fish for trout in Pennsylvania is apparently not a major deterrent to fishing. Only 1% of trout anglers reported that the distance took away from their trout fishing experience or caused them to participate less in trout fishing. Forty percent of trout anglers interviewed traveled 10 miles or less one way to fish while 11% traveled greater than 100 miles one way to fish (Duda et al. 2008; Figure 4). The 1991 survey documented that trout anglers averaged 20 fishing trips per year with a median of nine trips per year. Ten percent of the anglers made at least 48 trips per year (Hummon 1992).

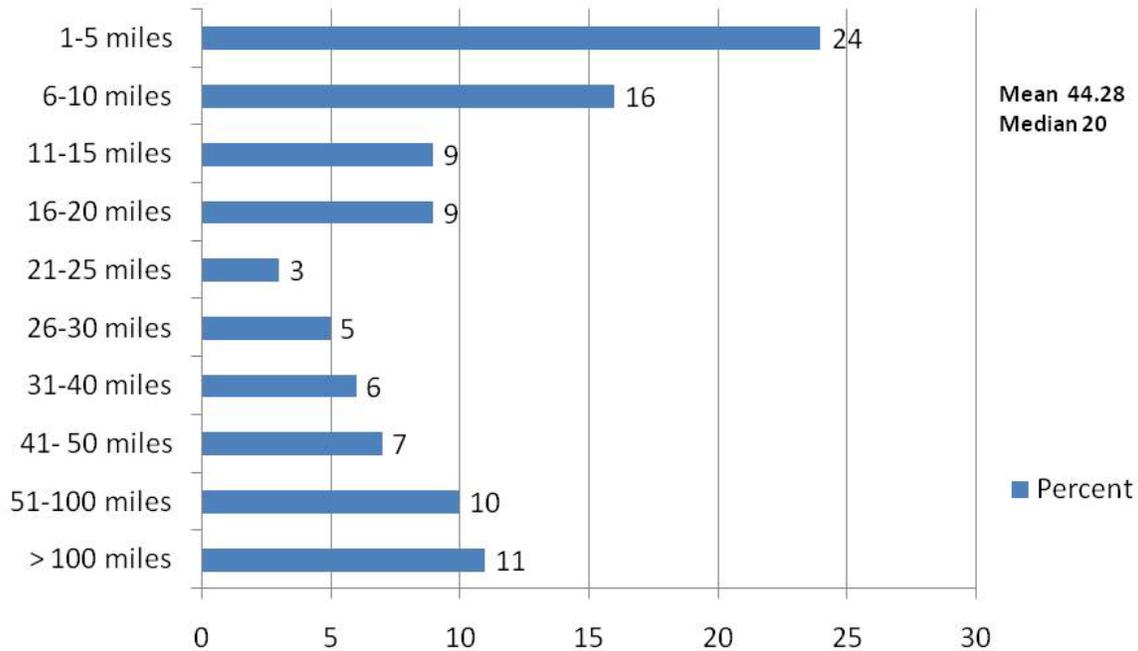


Figure 4. Distance traveled one-way to fish for trout.

Additional information from the 2008 survey indicated that about 9% of trout anglers considered their place of residence to be a large city or urban area, while 34% considered their place of residence to be in a rural area. The primary motivation for trout fishing in Pennsylvania was to relax (38%); the sport (28%) and to be with family and friends (21%). Only 3% of trout anglers fish to catch fresh fish to eat (Duda et al. 2008).

The majority of Pennsylvania's trout anglers prefer to use bait (53%) followed by lures (16%) and flies (15%). Stocked trout waters are an important resource for Pennsylvania's trout anglers as 78% spent greater than half of their trout fishing trips fishing for stocked trout. A majority of Pennsylvania trout anglers (66%) agreed that trout-stocked lakes with healthy populations of other species should be open to year-round fishing. Stocked trout waters are important in introducing children to fishing, as nearly 99% of surveyed anglers who fished with children fish for stocked trout at least half of the time (Duda et al. 2008). Duda et al. (2008) estimated that 34% of Pennsylvania trout anglers fish exclusively for stocked trout and 1% fish exclusively for wild trout. The remaining 65% spend time fishing for both wild and stocked trout.

Classification of Wild Trout Streams

Under 58 Pa. Code §57.11, the PFBC classifies waters as wild trout streams based on the presence of trout populations that have resulted from natural reproduction and where the habitat supports wild trout. The biological criteria for identifying a wild trout stream are that young-of-the-year trout less than 150 mm occur at some time in the stream section, and/or two or more ages of wild trout occur at some time within the stream section. Tributaries to wild trout streams are classified as wild trout streams for their function as habitat for segments of wild trout populations, including nurseries and refuges and in sustaining water quality necessary for wild trout.

With the inception of Operation Future in 1983, wild trout began to be considered in determining management strategies for flowing waters. Operation Future marked a change in management philosophy from recreation based management to resource based management where management decisions first took into consideration the potential effects on the fisheries resource. Following an analysis of a statewide inventory conducted during the late 1970's and early 1980's, biomass standards were established for classifying Wild Trout streams. The biomass criteria vary based on the species composition of the fishery (Table 1). Class A wild trout waters are a class of wild trout streams that meet the highest biomass thresholds and represent the highest quality of the Commonwealth's naturally reproducing trout populations. Under 58 Pa. Code §57.8a, it is the policy of the PFBC to manage self-sustaining Class A wild trout populations as a renewable natural resource to conserve that resource and the angling it provides. These stream sections are managed solely for the perpetuation of the wild trout fishery and receive no stocking. To be designated as a Class A wild trout water, a stream must be surveyed by PFBC biologists using approved protocols, meet species-specific biomass standards, and be officially designated as Class A by the Board of Commissioners. The PFBC maintains a list of these waters and it is available on the PFBC's website at: <http://www.fish.state.pa.us/classa.pdf>.

Table 1. Criteria used to determine the classification of biomass Class A, B, C, D, and E.

Class	Criteria
A (Brook Trout)	<ul style="list-style-type: none"> a. Total wild brook trout biomass of at least 30 kg/ha (26.7 lbs/acre) b. Total biomass of wild brook trout less than 15 centimeters (cm) or 5.9 inches in total length of at least 0.1 kg/ha (0.089 lbs/acre) c. Wild brook trout biomass must comprise at least 75% of the total wild trout biomass
A (Brown Trout)	<ul style="list-style-type: none"> a. Total wild brown trout biomass of at least 40 kg/ha (35.6 lbs. acre) b. Total biomass of wild brown trout less than 15 centimeters (cm) or 5.9 inches in total length of at least 0.1 kg/ha (0.089 lbs/acre). c. Wild brown trout biomass must comprise at least 75% of the total wild trout biomass
A (Mixed Brown and Brook)	<ul style="list-style-type: none"> a. Combined wild brook and wild brown trout biomass of at least 40 kg/ha (35.6 lbs. acre) b. Total biomass of wild brook trout less than 15 centimeters (cm) or 5.9 inches in total length of at least 0.1 kg/ha (0.089 lbs/acre). c. Total biomass of wild brown trout less than 15 centimeters (cm) or 5.9 inches in total length of at least 0.1 kg/ha (0.089 lbs/acre). d. Wild brook trout biomass comprises less than 75% of total trout biomass e. Wild brown trout biomass comprises less than 75% of total trout biomass
A (Rainbow Trout)	Total biomass of wild rainbow trout less than 15 cm (5.9 inches) in total length of at least 2.0 kg/ha (1.78 lbs/acre).
B	<ul style="list-style-type: none"> a. Total wild brook trout biomass of at least 20 kg/ha (17.8 lbs/acre) and less than 30 kg/ha (26.7 lbs/ acre). b. Total wild brown trout or wild brown and wild brook trout combined biomass of at least 20 kg/ha (17.8 lbs/ acre) and less than 40 kg/ha (35.6 lbs/acre).
C	Total wild trout biomass of at least 10 kg/ha (8.9 lbs/ acre) and less than 20 kg/ha (17.8 lbs/acre).
D	Total wild trout biomass greater than 0 kg/ha and less than 10 kg/ha (8.9 lbs/ acre).
E	Total wild trout biomass of 0 kg/ha.

Class A wild trout waters have a wide distribution across the Commonwealth. While the majority of the Class A sections are located in the northcentral and northeastern regions of Pennsylvania, 49 of the 67 counties in the state contain at least one Class A wild trout stream section (Figure 5).

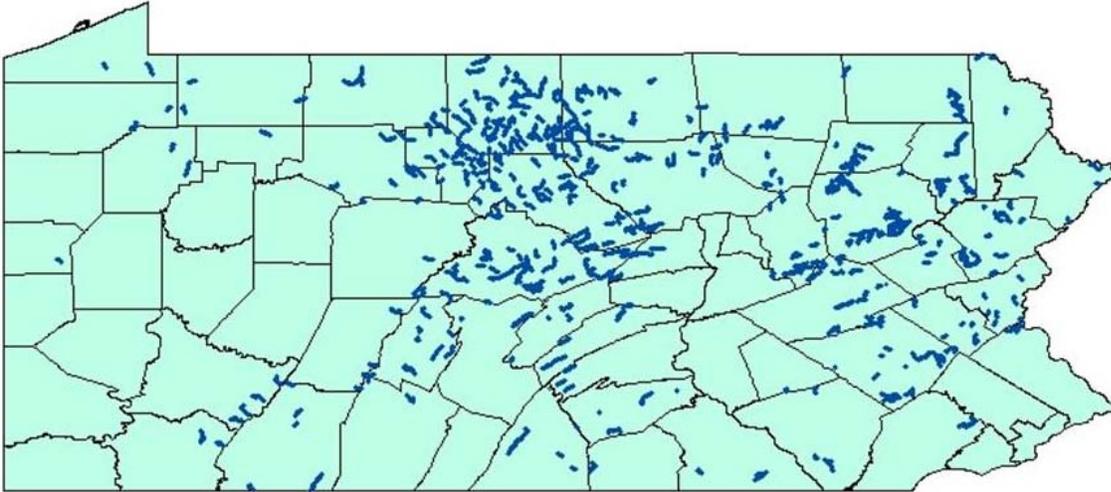


Figure 5. Statewide distribution of Class A Wild Trout Streams

At the time of the development of the stream classification system in 1983, there were 138 stream sections that had been documented to meet or exceed the Class A standards. This represented nearly 400 miles of stream. As more flowing waters were evaluated, the number of waters documented to meet the Class A designation expanded rapidly. By the end of 2008, 487 sections, representing 1,436 miles were managed as Class A wild trout waters. In the 25 years since the inception of the Class A wild trout program, an average of 41 miles of flowing waters have been added to the Class A program annually .

Biomass classes were also established for waters that supported a lower biomass of wild trout (Class B, C, and D waters; Table 1). The criteria are species-specific for Class B waters but Class C and D waters are classified based on total wild trout biomass. Similar to Class A wild trout waters, to be designated as a Class B, C, or D wild trout water, a stream must be surveyed by PFBC biologists using approved protocols, and must meet the specific biomass criteria for each classification (Table 1). Commissioner action is not needed, however, for classification as a Class B, C, or D water. The Commission maintains a list of these waters and it is available on the PFBC's website at: <http://www.fish.state.pa.us/classa.pdf>.

Prior to the development of the current plan, Class D waters included waters that were stocked with trout but which were not inhabited by any wild trout. With this plan a new Class E

has been developed. Class E waters are those which are not wild trout waters but which are still managed for trout fishing through stocking (Table 1).

A total of 1,772 stream sections have been documented to contain Class B, C, or D biomass levels (Figure 6). Of these, 1,215 sections are managed for wild trout with no stocking and 557 stream sections are stocked with hatchery trout (Table 2). The majority of these stocked sections (83%) are Class C or D waters that support only low to moderate densities of wild trout (< 20 kg/ha) . These streams are stocked to provide high quality and diverse recreational angling opportunities.

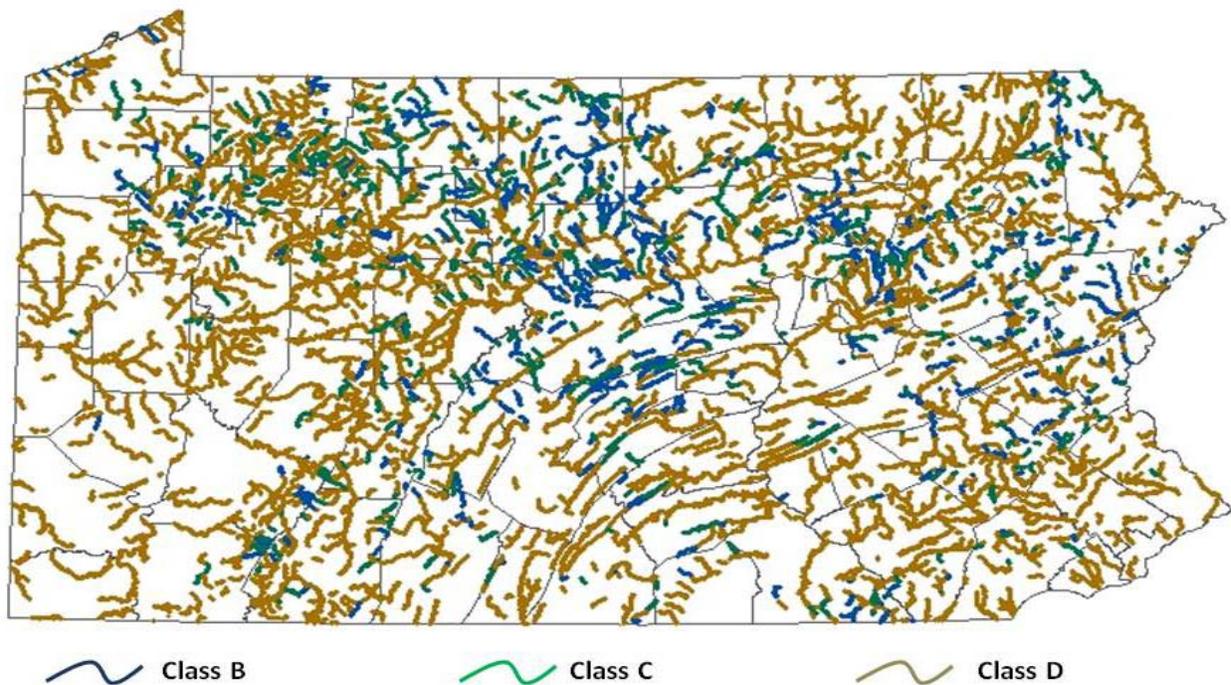


Figure 6. Statewide distribution of biomass Class B, C and D streams.

Table 2. Frequency of Class B, C, and D stream sections managed under various management strategies.

Biomass Class	# Sections Stocked	# Sections Unstocked	# Sections with Special Regs
B	80	347	27
C	139	347	14
D	338	521	20
Totals	557	1,215	61

Significance of PFBC Trout Water Classification to Resource Protection

All Commonwealth waters have a designated use, which determines the protection standards that the Pennsylvania Department of Environmental Protection (DEP) uses to permit development activities in watersheds. Wild trout streams should be protected at a minimum under the Coldwater Fishes (CWF) designation in 25 Pa. Code Chapter 93 because of their ability to support or maintain a population of wild trout. The PFBC notifies DEP whenever the agency designates new wild trout streams. DEP independently confirms that streams are wild trout waters by reviewing and verifying the PFBC’s data. Wetlands located in or along the floodplain of wild trout streams are protected as Exceptional Value Wetlands in 25 Pa. Code Chapter 105. This is the Commonwealth’s highest level of wetland protection.

Some wild trout streams receive additional protection under the Commonwealth’s special protection waters program (Pa. DEP 2003) and are designated as either High Quality Cold Water Fishes (HQ-CWF) or Exceptional Value (EV) based upon their biological and social characteristics. Wild trout streams managed as Wilderness Trout Streams qualify for the EV classification. The Wilderness Trout Streams program emphasizes trout angling in a relatively natural and remote setting. The program is designed to protect and promote wild trout fisheries, the ecological requirements needed for natural reproduction of trout, and wilderness aesthetics. Permits issued for streams classified as EV must be conditioned to maintain their existing level of water quality. Stream and wetland encroachment permits issued for development in watersheds that contain wild trout populations often include a seasonal restriction (no work from October 1 to December 31) to minimize impacts during the time trout are spawning.

Class A Wild Trout Waters are provided with special regulatory protection by DEP. Since these waters are the “best of the best” trout waters, they are protected by DEP with a 25 Pa. Code Chapter 93 designation as HQ-CWF. They receive special protection afforded by the antidegradation provisions of the federal Clean Water Act. This means that any activity that proposes to discharge to a Class A stream must comply with more stringent standards than those applied to other non-special protection waters.

The classification of stream sections as biomass Class A, B, C, or D has further significance in how streams are managed with respect to instream flow protection. For example, the Susquehanna River Basin Commission recognizes the PFBC’s biomass criteria as the basis for establishing varying levels of habitat impact criteria in its water withdrawal policy (SRBC Policy No. 2003-01; Table 3). DEP generally follows these same criteria in its water allocation permit reviews. Quantifying the level of habitat change for wild trout is done by way of the Pennsylvania Instream Flow Model, a computer model that was developed through an interagency study completed in 1998 (Denslinger et al. 1998).

Table 3. Effect of PFBC trout biomass classification system on SRBC water withdrawal permitting.

Category	Habitat Loss Criteria
Exceptional Value in 25 Pa. Code Chapter 93	Less than 5% (de minimus)
High Quality Cold Water Fishes or Class A	Less than 5% (7.5% with social and economic justification.)
Cold Water Fishes; Class B	Less than 10%
Cold Water Fishes; Class C and D	Less than 15%

Water quality protection of stocked trout streams ranges from Trout Stocked Fishes (TSF) to Exceptional Value (EV). DEP protects PFBC Approved Trout Waters (i.e., those approved by the Division of Fisheries Management for stocking) by applying water quality criteria that are designed to protect all of the stream’s coldwater aquatic life uses. Stream and wetland encroachment permits in these watersheds often include a seasonal restriction (no work from March 1 to June 15) to minimize conflicts with trout fishing. If some wild trout occur in a

stocked stream, it is usually classified as a CWF by DEP. If a stocked stream is classified by DEP as a HQ-CWF or EV, it is typically on the basis of such things as the presence of high quality macroinvertebrate communities rather than on the presence of wild trout (Pa. DEP 2003).

If streams are stocked, they typically are not classified in Chapter 93 as Warm Water Fishes (WWF). However, if this does occur, the PFBC brings such streams to DEP's attention and recommends a change in designation. Stocking trout in streams that were designated as WWF and subsequently designated as TSF provides additional water quality protection to the aquatic communities of those streams since lower temperature criteria apply for the period from February 15 through July 31 and higher dissolved oxygen criteria apply for the period from May 16 through August 15.

CHAPTER 3

MANAGEMENT OF WILD TROUT WATERS

Class A wild trout waters are managed with a variety of angling regulations. The majority of these waters (92%) are managed with a statewide minimum length limit of seven inches and a creel limit of five fish. Some Class A waters are managed with a variety of special regulations (Table 4). Currently, most Class A waters managed under special regulations are managed with some form of Catch-and-Release regulation; however, Trophy Trout and Wild Brook Trout Enhancement regulations, which both allow some harvest, are also utilized to manage Class A streams.

Since its inception, the Wilderness Trout Stream program in 1969, 31 Class A stream sections and 177 Class B, C, and D stream sections have been so designated (Table 4). Protection is achieved through the application of the highest DEP water quality classification (EV) and the prohibition of stocking.

The vast majority of biomass Class B, C, and D wild trout streams are managed under statewide size and creel limits; only 3% (61 stream sections) are managed under special regulations (Table 4). Of the 27 Class B stream sections managed under special regulations, 24 are managed using some type of catch-and-release regulation (Artificial Lures Only, Fly-Fishing Only, or Wild Brook Trout Enhancement). The remaining three sections are managed using Delayed Harvest Artificial Lures Only regulations. In contrast, 13 of the 34 Class C and D sections that are managed using special regulations are managed under some form of catch-and-release regulations, while 21 sections are managed under Delayed Harvest Artificial Lures Only regulations.

Table 4. Number of stream sections and miles managed under special regulations and statewide regulations.

Regulation	# Sections Class A	# Miles Class A	# Sections Class B, C, D, E	# Miles Class B, C, D, E
Catch and Release	13	31.2	4	11.3
Catch and Release – All Tackle	4	25.0	7	28.4
Catch and Release – Fly Fishing Only	6	14.3	28	46.1
Trophy Trout	10	26.2	0	0
Trophy Trout – All Tackle	1	7.0	1	9.0
Delayed Harvest	0	0	61	94.7
Brook Trout Enhancement	12	45.8	9	21.3
Statewide Regulations	442	1,285.5	4,415	19,093.1
Wilderness Trout Streams	31	100.0	177	454.6

Goals

The goals for PFBC management of Pennsylvania’s Wild Trout Waters are as follows:

1. Maintain Class A wild trout populations at Class A densities.
2. Improve wild trout populations where possible.
3. Identify new wild trout populations.
4. Maintain or improve free public access to these waters.
5. Use hatchery reared trout according to approved policy to provide high quality recreational angling opportunities where appropriate.

Stressors and Threats

The stressors and threats to Pennsylvania’s wild trout waters and public access to these waters are varied. Pennsylvania was once dominated by vast stands of hemlock trees which were virtually eliminated during the lumbering era of the late 1800’s and early 1900’s. The result of widespread lumbering led to an increase in erosion and elevated water temperatures, which undoubtedly caused many streams to become unsuitable for brook trout. Today, the continued existence of hemlock stands is vital for brook trout survival. These stands, which provide shade to streams thus, helping to maintain cool water temperatures, are in jeopardy due to the presence of the hemlock woolly adelgid *Adelges tsugae*, an Asian exotic insect species that feeds on the fluid of hemlock trees. Pennsylvania has also been a leading producer of coal. Chronic pollution from abandoned mine drainage often resulted following coal extraction. Currently, an estimated

5,497 miles of flowing water are affected by abandoned mine drainage in Pennsylvania (Pa. DEP 2006). Other major perturbations that continue to threaten Pennsylvania's coldwater resources include increased sedimentation and erosion stemming from development, road construction, and poor agricultural practices; water temperature elevations resulting from the loss of riparian vegetation, storm water runoff, dams, and urbanization; habitat degradation stemming from poor land use practices and the growing need for oil and gas extraction; acidification from acid deposition; and flow reductions resulting from an increasing demand for water withdrawals. Recently, new technologies have made the extraction of natural gas from Pennsylvania's Marcellus shale beds profitable and Pennsylvania has experienced dramatic increases in the number of gas wells being drilled. Negative impacts to the Commonwealth's aquatic resources have already been documented from this method of gas extraction and further perturbations are likely as drilling increases. Though difficult to document in the short term, concerns with long-term climate change may pose another significant threat to our cold water resources.

Of the 64,345 streams totaling approximately 86,000 miles of flowing water in Pennsylvania, the PFBC has conducted surveys and/or implemented management on 4,877 streams totaling 24,959 miles. As a result, only 8% of the streams and 29% of the total stream miles are being actively managed. Of the waters yet to be surveyed, many likely support wild trout populations. The primary threats to unassessed trout waters are inadequate water quality protection due to the unknown condition of the trout population and the resulting permitting actions that are not properly conditioned to protect wild trout. Of course non-point source pollution impacts unassessed waters as well. Proper stream classification is vital as the likelihood that these streams will be impacted by stressors will increase in the future. Pennsylvania's Wildlife Action Plan specifically identified brook trout as a species of greatest conservation need. The identification of wild brook trout populations is required to provide proper protection for them and enable this species to proliferate. The PFBC's statement of policy at 58 Pa. Code §57.11 states that "It is the policy of the Commission to accurately identify and classify streams supporting naturally reproducing populations of trout as wild trout streams." This will continue to be a focus of future wild trout management in the Commonwealth.

As more and more people move away from the cities and purchase land in rural and suburban areas, some properties that were traditionally privately owned but open to free public access are being posted against trespass. Additionally, posting has occurred as a result of littering and other disrespectful acts committed by some anglers while fishing on private property that were open to public fishing. This is resulting in the loss of access to popular fishing locations. More recently, properties that border some of the Commonwealth's better trout waters are being purchased or leased by private fishing clubs, which is resulting in fewer waters open to the public. Free access to fishing is vital to the continued participation in and growth of this activity. The PFBC is currently developing a statewide access plan designed to identify, prioritize, and secure long-term access for anglers and boaters of the Commonwealth.

Stressors can also exist from the very anglers that are served by these resources. Many Class A waters are relatively unknown and are not frequented by anglers. As confirmed by the results from the *2004 Angler Use, Harvest, and Economic Assessment on Wild Trout Streams in Pennsylvania*, angler use and harvest tends to be low on wild trout streams (Greene et al. 2005). Therefore, many of these waters are not subjected to many of the stressors associated with heavy angling activity. However, some waters are extremely popular and receive high use by anglers with diverse expectations. Management of these waters must take into consideration protection of trout populations from unacceptable losses due to the stresses of hooking, handling and releasing fish.

Finally, there is a threat that comes from the lack of understanding by the public of the wild trout classification system used by the PFBC. This lack of understanding has periodically resulted in conflict between the PFBC and the public during the classification process. These controversies have to the potential to erode angler relationships with the PFBC, pit angler interest groups against each other, and lead to delays in management actions aimed at protecting and improving the resource.

Opportunities

Opportunities exist to protect known wild trout populations as well as expand the number and miles of streams officially designated as wild trout. The opportunities to expand the number

and quality of wild trout waters include the examination of waters that have not been inventoried to date, the use of habitat manipulation to improve wild trout habitat, promotion of best management practices in watersheds that have been impacted by poor land use, and the application of fisheries management regulations on waters where angler harvest and fishing mortality are significant enough to inhibit trout fisheries from achieving their full potential. Successes in these areas can lead to the opportunity to afford these waters higher water quality protection. Also, the identification or expansion of wild trout populations will be publicized, thus providing the public with the opportunity to fish for wild trout. Inherent in these opportunities is the opportunity to educate anglers and other constituents of the wild trout classification system used by the PFBC. A better public understanding of this classification system has the potential to benefit the PFBC in numerous ways including, better relationships between the PFBC and the public, better water quality protection, and more efficient use of hatchery reared trout as a result of a greater public awareness of the excellent fisheries provided by high biomass wild trout populations that are not stocked.

The agency has been effective in acquiring funding through many grant programs for habitat improvement on wild trout streams. This includes such things as funding provided through State Wildlife Grants, DEP's Growing Greener grant program, the National Fish and Wildlife Foundation grant program, and the Eastern Brook Trout Joint Venture (EBTJV). The EBTJV is a cooperative effort between fish and wildlife agencies from 17 states in the eastern United States which has been officially recognized as part of the National Fish Habitat Initiative. It is designed to address regional and range-wide threats to brook trout by halting the decline of this species and restoring fishable populations. As part of this effort, Pennsylvania has developed a set of Brook Trout Conservation Strategies designed to focus on improving conditions for wild brook trout populations in the Commonwealth. To date, a total of three grants have been received by the PFBC for projects utilizing EBTJV funds.

Properly mitigating, reducing or eliminating these stressors and threats often requires careful and coordinated efforts. Opportunities to reduce the negative impacts of sedimentation and erosion stemming from agriculture, development, and road construction exist by encouraging the use of best management practices through partnering with government agencies,

conservation groups, and private individuals. These partnerships also provide opportunities to increase the amount of work being targeted at addressing water temperature elevation, habitat degradation, the loss of riparian vegetation, and acidification. The potential allocation of a portion of proceeds from a Marcellus Shale severance tax to the PFBC related to the increased interest in oil and gas extraction in the state, provides an opportunity for education and the collaborative use of best management practices to minimize environmental impacts, further advocate for watershed protection, enhanced environmental permit review,, greater potential for habitat improvement work, and increased access to trout fisheries.

The removal of instream obstructions such as dams, which act as barriers to fish movement, can be beneficial to trout populations. The removal of dams can improve water temperature, reduce sediment accumulation, improve instream habitat, and allow wild trout populations to recolonize in upstream areas.

Public education is the main tool for preventing the spread of aquatic invasive species. The PFBC has recently placed informational signs at boat ramps, featured the topic on its website and in its publications, and collaborated with other agencies in public education efforts. The PFBC has also passed regulations that make the possession, introduction, or transportation of such certain invasive species illegal. The PFBC is a member of the Pennsylvania Invasive Species Council, and is working closely with Sea Grant, which is currently developing a statewide plan to address these issues.

Many Class B, C, and D waters are not stocked with trout and are not subject to the stressors associated with heavy angling activity. As confirmed by the results from the *2004 Angler Use, Harvest and Economic Assessment on Wild Trout Streams in Pennsylvania*, angler use and harvest tends to be low on most wild trout streams (Greene et al. 2005). However, a total of 557 Class B, C, and D stream sections that support wild trout populations are stocked with adult trout by the PFBC. In addition, over 600 waters, many of which are Class B, C and D wild trout waters, are stocked with trout through the Cooperative Nursery Program (CNP). The CNP is a cooperative effort between the PFBC and the sportsmen of Pennsylvania to:

1. Provide increased fishing opportunities for public angling.
2. Provide sporting groups with an educational opportunity in culturing fish.
3. Promote public involvement in PFBC programs.
4. Increase PFBC involvement in local group fishing interests.
5. Support local groups' initiatives to provide fish for special events.

The PFBC's, Cooperative Nursery Unit (CNU) supports 151 sponsors who manage 168 hatcheries in 49 counties throughout the Commonwealth. Combined, these nurseries receive approximately 1.2 million, four to six inch brook, brown, rainbow, and golden rainbow fingerling trout from the Benner Spring, Corry, Huntsdale, Oswayo, and Reynoldsdale State Fish Hatcheries (SFH). One sponsor in Erie County receives steelhead eggs from Tionesta SFH, while another one receives steelhead fingerlings from Tionesta SFH. Participants in the CPN annually stock an average 1million catchable adult trout (25% of state total) and 100,000 steelhead smolts (10% of state total) for the anglers of Pennsylvania. In addition, two sponsors in Erie County are raising brown trout to contribute to the PFBC's newly developed program to establish a near shore brown trout fishery in Lake Erie.

The combination of attracting high numbers of anglers through stocking, and the competition with hatchery trout may suppress the potential to expand wild trout populations on some of these waters. This is of particular concern on the Class B waters. Phasing out all stocking on these streams is an approach that should be explored in an attempt to improve wild trout populations on them to Class A levels.

Maintaining access on waters currently open to trout fishing and opening new water areas to public access is vital to the continued participation and growth of trout fishing in the Commonwealth. Taking advantage of opportunities to partner with conservation groups and private individuals can be beneficial in either securing long-term public easements or the outright purchase of riparian lands to provide access for public angling. Cooperative efforts could also be used to improve landowner relations through the implementation of landowner recognition programs that are designed for the purpose of maintaining public access for fishing.

Strategies

The following strategies, address the highest priority issues related to the threats and opportunities that face the Commonwealth's wild trout resources. These priorities, which will be addressed throughout the life of this strategic plan, are designed to protect, conserve, and enhance our wild trout resources while providing enhanced fishing opportunities for the anglers of the Commonwealth. Addressing these issues will be the focus of the PFBC's wild trout management program during the next five years.

Issue 1: The PFBC has not assessed all of the streams throughout the Commonwealth. As a result, the total number of streams that support wild trout populations in Pennsylvania is unknown, which leads to inadequate protection for these streams. The PFBC does not currently have the ability to assess these most at-risk streams at a rate that outpaces the rate of degradation.

Strategies:

- By January 2010, develop a prioritized list of uninventoried streams that are likely to support wild trout and are the most at risk from the effects of human activities.
 - Develop GIS technology to identify potential wild trout streams in association with high development areas and use a sampling approach based on priority ranking.
- Sample 200 uninventoried streams over the next five years.
- Develop a status and trends monitoring program for wild trout streams.
- Annually update priority list of uninventoried streams.
- Develop a means to involve interested conservation and sportsmen organizations in identifying wild trout populations in uninventoried waters.

Issue 2: There are a number of streams that may hold Class A biomass trout populations that have not been officially designated as Class A streams by the PFBC. This leads to inadequate water quality protection for these waters and inconsistent application of fisheries management strategies.

Strategy:

- By 2014, sample waters identified by PFBC staff as likely to support a Class A wild trout biomass and designate appropriately.

Issue 3: Currently, the PFBC stocks adult trout in a total of 80 stream sections that support at least a minimum Class B wild trout biomass. There may be the potential to improve the wild trout biomass on some of these waters through the cessation of stocking.

Strategy:

- Beginning in 2010, evaluate at least 10 of these waters to determine if the cessation of stocking results in an increase in wild trout biomass from Class B to Class A.
- Review wild trout biomass changes that may have occurred as a result of the cessation of stocking that has already occurred on Class B stream sections where historic data are available.

Issue 4: Anglers, as well as the general public, do not have an adequate understanding of the classification system used to define wild trout populations throughout the Commonwealth.

Strategy:

- Beginning in January 2010, identify and implement the most effective communication tools to better educate the general public of the PFBC wild trout classification system.

Issue 5: The cumulative effects of human development have been inadequately addressed in permitting actions.

Strategy:

- By June 2010 initiate discussions with natural resource management agencies, conservation organizations, municipalities and regulatory agencies to address the cumulative impacts of development and how these might be better addressed in future permit decisions.

Issue 6: Invasive species and pathogens such as didymo, round goby, zebra mussels, and VHS threaten our trout fisheries.

Strategies:

- By December 2010, review the Fish and Boat Code and the PFBC's fishing regulations concerning introduction, propagation, and transportation of fish in Pennsylvania's waters and determine what changes are needed to help prevent the spread of invasive species and pathogens.
- By December 2010, implement effective outreach and education programs identified in the Aquatic Invasive Species Management Plan.
- Fully implement the agency's new biosecurity policy in 2010.

Issue 7: Maintaining free public access to Pennsylvania's wild trout fisheries is important to provide trout angling opportunities.

Strategies:

- Improve public access to at least 20 wild trout streams between 2010 and 2014. Access improvements may include, but are not limited to improved parking areas, long-term access easements, and purchase of riparian lands.

Highest priority will be placed on streams with high quality fisheries that can support the potential increased use resulting from improved access.

- Work with PFBC access coordinators to create awareness by decision makers of state and local organizations of the need to secure public access and provide direct assistance in order to implement public access initiatives; be proactive in pursuing landowner easements along wild trout streams.
- Whenever possible, on wild trout streams with PFBC assisted habitat improvement projects, assure public access as well as parking and signage that encourages use of the site and provides information on the benefits of the project.
- By December 2010, develop a landowner relations program as described in the Agency Strategic Plan to better acknowledge and show appreciation to private landowners who allow habitat improvement work and public access on their land.
- By 2014 investigate the potential to develop a dedicated source of funding to be used to improve access on public waters throughout the Commonwealth.

Issue 8: The expansion of wild trout populations is impeded in streams where habitat has been identified as the primary limiting factor. Furthermore better knowledge of the effects of habitat manipulations on wild trout populations is needed.

Strategies:

- Assess watershed conditions to identify habitat limiting factors on wild trout streams. Apply a watershed-level approach, when possible, to all large-scale habitat enhancement projects.
- By January 2011, develop an objective prioritization process for selection of habitat enhancement projects on wild trout streams.
- Conduct at least 80 instream and/or riparian habitat enhancement projects on wild trout streams between 2010 and 2014.
- Seek additional grant funding for habitat work on wild trout streams, e.g. funding available through the Eastern Brook Trout Joint Venture.
- Partner with 20 different conservation groups, schools, and government agencies on habitat enhancement projects on wild trout streams between 2010 and 2014.
 - Work with conservation groups, watershed associations, schools, prison programs, farmers, etc., to develop good working relationships, as partnerships are a key component to implementing high quality habitat enhancement projects.
 - Provide technical assistance to project partners in identifying and prioritizing projects to most effectively assist the PFBC in enhancing and restoring habitat in wild trout streams.

- Provide 10 workshops or presentations that include hands-on training for project partners to increase their ability to implement high quality projects on wild trout streams between 2010 and 2014.
- Partner with conservation groups and other agencies to obtain outside funding to help cover the cost of 15 habitat enhancement projects on wild trout streams between 2010 and 2014.
- By January 2011, develop a comprehensive monitoring program to evaluate the response of both wild trout populations and physical habitat conditions to the various types of habitat treatments conducted on wild trout streams.

Issue 9: Through their ability to impede movement, trap sediment and increase water temperatures barriers remain a deterrent to fully functional wild trout streams.

Strategies:

- When deemed biologically appropriate, remove barriers and/or improve fish passage on five wild trout streams between 2010 and 2014.
- By December 2014, develop routine maintenance schedules for all projects completed on wild trout streams between 2010 and 2014.
- Support research on movement of wild trout populations in Pennsylvania streams.

Issue 10: Impairment of the natural flow regime through water withdrawals and reservoir operations threatens the quality of wild trout waters.

Strategies:

- Encourage DEP to implement the Pennsylvania Instream Flow Model and other scientifically valid instream flow protection measures in all DEP regions by December 2010.
- By January 2013, develop additional instream flow methods and criteria for statewide application in concert with DEP, other government agencies, and non-governmental organizations such as The Nature Conservancy.
- Continue to work closely with the New York Department of Environmental Conservation (NYDEC) and the PA and NY parties to the 1954 U. S Supreme Court Decree to achieve greatly improved operating rules to protect and improve the upper Delaware River trout fishery.
- Work closely with the Pennsylvania Department of Conservation and Natural Resources, DEP, Utilities, and the U. S. Army Corps of Engineers to improve tailwater fisheries through improved flow management in tailwater fisheries across the state (e.g. F. E. Walter Reservoir on the Lehigh River, Blue Marsh Reservoir on Tulpehocken Creek, Lackawaxen River below Lake Wallenpaupack).

Issue 11: Criteria for the inclusion of waters into special regulation programs for trout fisheries are lacking and the degree to which special regulation programs are meeting management objectives needs to be fully evaluated.

Strategies

- By 2011, develop specific criteria that trout waters must meet in order to be included in a special regulation program. At a minimum these objectives should include or consider the following:
 - Whether special regulations are necessary and supported biologically, e.g., to improve the quality of the fishery or to protect recovering fish populations.
 - Whether harvest or tackle types limiting factors to the potential quality of the fishery.
 - An evaluation of the potential impact on angler participation if angling regulation changes are proposed or enacted.
 - Whether the regulation exclude segments of the angling public, especially children.
 - Whether different regulations for children can be considered to encourage angling by this segment of the population.
 - What are angler opinions regarding the regulation change. This could include posting a notice of proposed new areas one year prior to implementation of the regulations in order to receive public comments.
 - What are the implications of public versus private ownership to the proposed regulation?
- By 2011, develop a sampling strategy to determine if waters currently managed under special regulations have met the developed set of specific criteria in order to remain in a special regulation program. This should include specific biological and social objectives.
 - By 2011, develop and implement a study to evaluate the use of bait and tackle restrictions (artificial lures and flies) on special regulation areas. Examinations would include areas managed under catch-and-release regulations (Catch-and-Release, Catch-and-Release Fly-Fishing Only, and Catch-and-Release All Tackle) and areas where some harvest is permitted under elevated minimum length limits and reduced creel limits, such as All Tackle Trophy Trout and Trophy Trout areas.
 - By 2011, complete an assessment of the Wild Brook Trout Enhancement program and determine if the program should be continued, modified, or eliminated.

CHAPTER 4

MANAGEMENT OF STREAMS WITH TROUT FISHERIES MAINTAINED BY STOCKING

A total of 530 stream sections, covering 2,294 stream miles, that have no reproduction of trout (new PFBC Class E) provide excellent recreational trout angling opportunities through the stocking of hatchery reared trout (Figure 7). These sections characteristically have suitable water temperatures during the spring to maintain stocked trout. However, as summer progresses, water temperatures in these sections warm to levels that preclude the survival of trout. Many of these sections have good coolwater or warmwater fish communities while others can be characterized as transitional and support few if any gamefish.

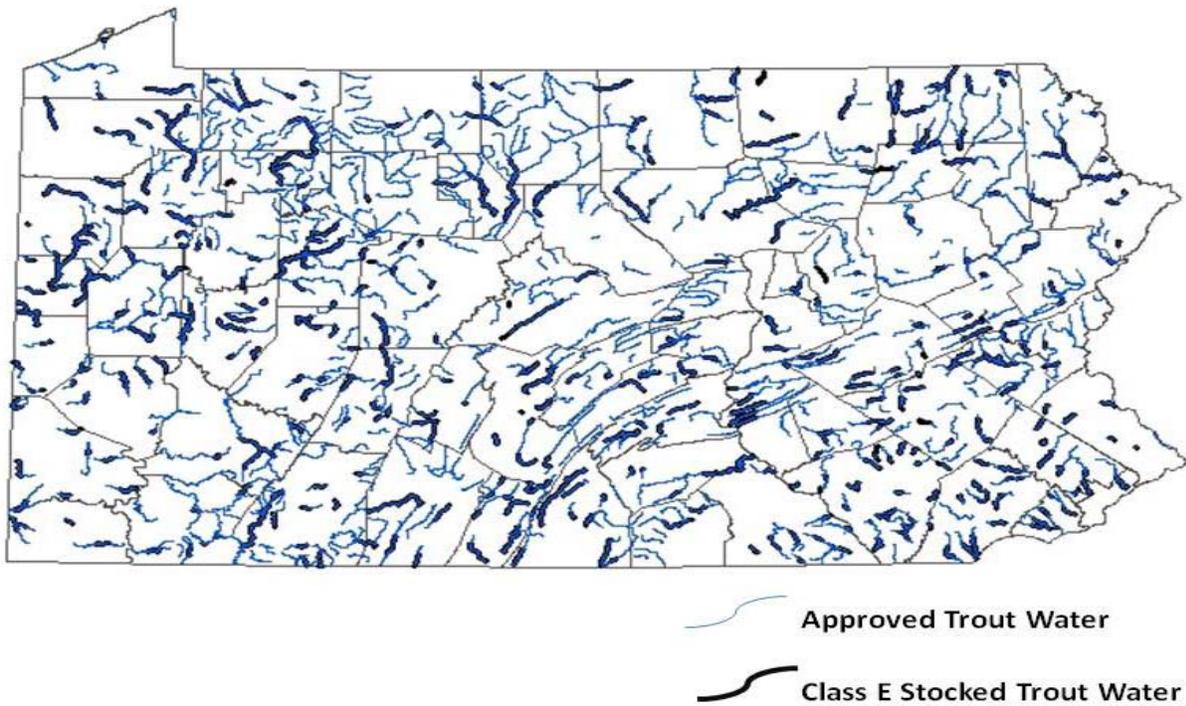


Figure 7. Statewide distribution of biomass Class E streams.

The majority (91%) of stream sections managed for trout that have no wild trout present are regulated under statewide size limits of 7 inches and creel limits of five fish; the remaining 9% (49 sections) are managed with special regulations. Thirty-seven are managed with Delayed

Harvest Artificial Lures Only (DHALO) regulations, and 12 are managed using Catch and Release Fly-Fishing Only (FFO) regulations.

Trout Hatcheries

Approximately 3.2 million adult trout are stocked in Commonwealth waters annually (Table 5). PFBC hatcheries raise about 3.1 million adult trout while another 100,000 adult trout are reared at the U.S. Fish and Wildlife Service's (USFWS) Northeast Fishery Center in Lamar, PA, and stocked by PFBC staff as part of a cooperative agreement. The trout raised at the USFWS facility are distributed among several PFBC hatcheries and are included in the Table 5 totals.

Brook, brown, rainbow, and golden rainbow trout are produced at eight PFBC state fish hatcheries. These facilities are located in Bedford (1), Centre (3), Clinton (1), Cumberland (1), Erie (1), and Potter (1) counties. Seven hatcheries raise trout exclusively in concrete raceways while the Reynoldsdale facility uses a combination of earthen and concrete rearing units. Spring, well, and surface water sources are used throughout the production system. Some hatcheries have a single water source while others receive water from multiple locations. Four hatcheries utilize partial water recirculation periodically throughout the production cycle.

A five-year pilot study to evaluate the feasibility of purchasing adult trout from private hatcheries to augment PFBC production expired in February 2009. The PFBC purchased 644,000 adult rainbow trout during this period with prices ranging from \$1.09 to \$1.23 per fish. Invitations to bid on a similar contract that began in March 2009 were advertised in the spring of 2008. Only one bid was received at a price of \$3.38 per fish. Due to this significant cost increase, the PFBC decided to discontinue this program.

In addition to raising adult trout, seven PFBC hatcheries provide about 2.3 million fingerlings for use in two management programs (Table 6). About 1.14 million put-grow-take fingerlings are stocked in waters that support adequate habitat and food for year-round survival and growth. Another 1.2 million fingerlings are distributed to 169 local sportsman's

organizations participating in the Cooperative Nursery Program. These fingerlings are raised to adult size and stocked in waters open to angling.

Table 5. Annual adult trout production goals.

HATCHERY	BROOK	BROWN	RAINBOW	GOLDEN	TOTAL
BELLEFONTE	103,280	177,900	302,110	1,310	584,600
BENNER SPRING	99,650	138,240	322,915	1,295	562,100
CORRY	49,870	104,270	152,505	1,055	307,700
HUNTSDALE	35,260	94,250	273,420	1,270	404,200
OSWAYO	66,150	53,300	118,680	370	238,500
PLEASANT GAP	61,130	82,530	283,030	1,210	427,900
REYNOLDSDALE	33,610	50,200	111,840	650	196,300
TYLERSVILLE	71,710	144,450	231,755	1,485	449,400
TOTALS	521,060	850,930	1,804,845	8,665	3,185,500

Table 6. Annual put-grow-take and cooperative nursery fingerling production goals.

HATCHERY	PUT-GROW-TAKE FINGERLINGS				
	BROOK	BROWN	RAINBOW	GOLDEN	TOTAL
BELLEFONTE	0	127,500	10,000	0	137,500
BENNER SPRING	0	130,200	11,000	0	141,200
CORRY	0	113,500	150,000	0	263,500
HUNTSDALE	0	109,900	54,700	0	164,600
OSWAYO	0	25,000	0	0	25,000
PLEASANT GAP	0	122,300	92,300	0	214,600
REYNOLDSDALE	15,000	93,700	37,200	0	145,900
TYLERSVILLE	0	0	0	0	0
TOTALS	15,000	772,100	355,200	0	1,092,300
HATCHERY	COOPERATIVE NURSERY FINGERLINGS				
	BROOK	BROWN	RAINBOW	GOLDEN	TOTAL
BELLEFONTE	0	0	0	0	0
BENNER SPRING	92,000	63,000	101,000	2,950	258,950
CORRY	35,000	20,000	27,000	450	82,450
HUNTSDALE	53,000	35,000	107,000	2,200	197,200
OSWAYO	201,800	51,000	75,000	3,600	331,400
PLEASANT GAP	0	0	0	0	0
REYNOLDSDALE	117,000	47,000	162,000	3,600	329,600
TYLERSVILLE	0	0	0	0	0
TOTALS	498,800	216,000	472,000	12,800	1,199,600

An independent comprehensive evaluation of the PFBC fish production system was completed by HDR/FishPro in 2002. The report generated from this study included multiple options available to upgrade PFBC hatcheries to improve effluent water quality and enhance fish production efficiency. Following enactment of the Growing Greener II initiative in 2005, the PFBC received \$27.5 million dollars of which the PFBC allocated \$24.5 million dollars to fund some of the recommended waste water treatment upgrades at trout hatcheries suggested by HDR/FishPro. Growing Greener II (Act 45 of 2005), is a state government program that allocated \$625 million to address some of the state's most pressing environmental problems, spark new growth in core communities, and create new opportunities for citizens. Other capital project funds are also being used to improve facilities.

Below is a current list of hatchery renovation projects:

- Tylersville State Fish Hatchery – Installed state-of-the-art microscreen filtration system in 2006 to treat entire hatchery discharge flow. Since this system became operational, the amount of total suspended solids (TSS) discharged into Fishing Creek has decreased by 60-70 %.
- Pleasant Gap State Fish Hatchery - Installed state-of-the-art microscreen filtration system with recirculation capability in 2007. TSS levels in the hatchery effluent decreased by 74% in the first year of operation.
- Huntsdale State Fish Culture Station - Effluent treatment system, including microscreen filtration and a new settling pond, are being constructed and will be operational in 2010.
- Benner Spring State Fish Hatchery – Effluent treatment and recirculation systems similar to the one currently in use at the Pleasant Gap are being constructed and will be operational in 2010.
- Bellefonte State Fish Hatchery – Effluent microscreen filtration system including recirculation capability is currently in the construction stage and will be completed by October 2009.
- Corry State Fish Hatchery – Two new wells have been developed that will provide an additional 1,600 gallons per minute (gpm) of water to optimize production. The design for a pipeline to carry water to the hatchery is complete and start of construction is scheduled for 2010. Provision of this water will reduce the need to recirculate water within the hatchery resulting in better rearing conditions and lower ammonia levels in the hatchery effluent.

- Oswayo State Fish Hatchery – Rehabilitation of a dormant well will provide an additional 400 – 500 gpm fresh water to optimize production. The design of the pipeline to the hatchery is currently under way. Use of this water will minimize the need to recirculate water within the hatchery, resulting in lower ammonia levels in the hatchery effluent.
- Reynoldsdale State Fish Hatchery – Plans to replace the earthen pond rearing units with a state-of-the-art circular tank facility are in the final design stage. The new hatchery will be under a covered pavilion and will utilize both fresh and recirculated water. An effluent microscreen filtration system similar to the ones describe above will also be installed. Construction is scheduled to begin in 2010.

Hatchery Operations

Current Species, Size and Numbers Produced

The numbers of adult and fingerling trout produced annually are shown in Tables 5 and 6 above. The target size for adult trout is 11 inches and 0.55 – 0.61 pounds per fish. Target size for put-grow-take and cooperative nursery fingerlings is 4 – 6 inches. Due to water quality and quantity concerns, no substantial changes in numbers or size of trout produced are expected in the near future. However, pending the results of an ongoing trout spawning, incubation, and survival study, species distribution among hatcheries may be adjusted.

Cost

During the fiscal years 2006-07 and 2007-08, the average direct hatchery cost to produce an 11-inch, 0.6 pound trout in a PFBC hatchery was estimated at \$1.67. This cost estimate included personnel and operating expenditures at the eight trout hatcheries and is used internally to compare hatchery efficiency. This estimate does not include administrative overhead, capital expenditures, engineering costs, law enforcement expenditures to direct stocking operations, Fish Production Services costs to support hatchery operations, biological surveys to assess and monitor trout stocked streams, or other indirect costs. The PFBC cost per adult trout for all the above activities is referred to as the total program cost and averaged \$2.73 per trout during fiscal years 2006-07 and 2007-08.

Personnel expenditures account for 65% - 70% of total trout production costs. The PFBC has kept increases in personnel costs to a minimum by reducing rank and file (fish culturist) staff

positions by 22% since 2000 in the eight trout production hatcheries. Nevertheless, trout hatchery operational costs have increased 20% since the 2003 - 04 fiscal year. Vehicle fuel and maintenance and fish food account for almost 50% of total operational costs annually. Trout production personnel and operating costs accounted for 16% of the total PFBC expenditures in the 2006-07 fiscal year.

Goals

The goals for trout management in streams with no natural reproduction of trout are to:

1. Enhance angling diversity and provide high quality recreational trout angling opportunities through the stocking of adult trout.
2. Maintain or enhance public access to these stocked trout sections.
3. Maintain or enhance the quality of the water and habitat that support these fisheries.

Stressors and Threats

The stressors or threats to stocked trout waters result from a variety of causes, many of which are the same as the threats to wild trout waters. The primary threats include the loss of public access due to landowner posting, and degradation in water quality and habitat from sedimentation and erosion stemming from development, road construction, urbanization, and poor land use practices. In addition, storm water runoff, oil and gas extraction, acidification from acid deposition and mining, elevated water temperatures from the loss of riparian vegetation, and flow reductions resulting from an increased demand for water withdrawals can all severely degrade these waters to a point where conditions are not suitable for the stocking of hatchery trout.

Studies conducted by the PFBC since 2005 indicate that early season movement of stocked trout out of stocked waters between the time of stocking and the opening day of trout season is a threat to providing angling opportunities on perhaps 10% or more of trout stocked streams. To date, no single factor has been identified as the primary contributing factor to this problem. However, it has been suggested that high concentrations of total and dissolved

Aluminum may be contributing factors to this issue on some trout stocked waters. This variable has not been evaluated, to date.

Opportunities

Opportunities exist through the use of stocked trout to provide high quality recreational angling opportunities on streams that would otherwise provide little or no angling opportunities. Trout stocking provides an opportunity to target streams close to large population centers with limited recreational opportunities and develop unique programs tailored to specific user groups. Artificial propagation of trout provides the PFBC with the ability to stock trophy size fish and to ensure that anglers have an opportunity to fish over high densities of trout, which increases the likelihood of catching a fish.

Maintaining access on waters currently open to fishing and opening new waters to the angling public is vital to the continued participation and growth of trout fishing in the Commonwealth. Efforts to partner with conservation groups and private individuals can be beneficial in securing long-term public easements or purchasing riparian lands to provide public access. Cooperative efforts such as landowner recognition programs could be used to improve landowner relations.

Disseminating information on existing trout angling opportunities and efforts to educate and inform anglers on how and where to fish for trout can be used to expose new anglers to trout fishing and address concerns with declining angler participation rates. Efforts to partner with conservation groups and private anglers to develop an angler mentoring program may be beneficial towards this end.

Encouraging the use of best management practices can reduce the negative impacts of sedimentation and erosion stemming from agriculture, development, road construction, urbanization, and oil and gas extraction. Many of these issues can be addressed through coordinated efforts to partner with other government agencies, conservation groups, industry, and private individuals. Water temperature elevations resulting from habitat degradation, the loss of riparian vegetation, and storm water runoff can be addressed through increased stream

improvement efforts that include plans for restoring riparian vegetation. Problems with acidification can be mitigated by implementing liming or other water treatment projects conducted in partnership with other government agencies, conservation groups, and private individuals.

Currently, the PFBC has little knowledge of fingerling trout stocking success or angler use and harvest in stream sections stocked with fingerlings. Studies designed to measure these variables will provide the data needed to produce better fisheries through the manipulation of stocking rates, life stages stocked, species composition, and selection of angling regulations.

The PFBC's hatcheries represent a significant cost to the agency. Opportunities exist to operate these facilities in a more efficient manner. These include revising the trout distribution system; trying new and improved feeds, revising the feed bidding process using databases to improve record keeping and enhance fish production planning, and using recirculation systems where feasible to improve water quality. New technology exists to improve the quality of the effluent from the hatcheries. Installation of this technology will be required in order to meet increasingly stringent effluent treatment criteria in NPDES permits.

Research is needed to examine the performance of existing PFBC hatchery brood trout stocks with respect to growth, disease resistance, and vigor. By partnering with the USFWS Northeast Fishery Center, an examination of PFBC brood stocks can be conducted to determine if new brood strains should be introduced into the trout production system to improve PFBC hatchery stocks.

Strategies

The following strategies address the highest priority threats and opportunities to the provision of high quality trout angling opportunities on the Commonwealth's streams with no wild trout reproduction. These priorities are designed to protect, conserve and enhance water quality in streams with no wild trout reproduction while providing enhanced fishing opportunities for the anglers of the Commonwealth. General needs already identified above

related to protection of these waters, such as water quality and water quantity protection, and the control of aquatic invasive species, will not be repeated here.

Issue 12: New and innovative technology is needed to ensure protection of aquatic resources downstream of PFBC trout hatcheries.

Strategies:

- Annually evaluate the effect of hatchery upgrades and operational changes on effluent water quality and production efficiency.
- Continue to evaluate current hatchery infrastructure in order to prioritize future hatchery renovations. Implement operational changes with the goal of increasing production efficiency as measured by cost per fish raised.

Issue 13: PFBC hatchery water quality and quantity will affect future operational capability.

Strategies:

- By 2013 complete development of a database to track water quantity and quality at each hatchery in order to more effectively comply with environmental regulations and plan future production capacity.
 - Monitor hatchery influent and effluent water quality and flows using updated measuring equipment that will allow for more accurate monitoring of hatchery operations.
 - Hydrologic studies of the water sources for the Benner Spring, Bellefonte State and Pleasant Gap Fish Hatcheries have been completed. Studies of the water sources at the five remaining trout hatcheries will be completed by 2014.

Issue 14: Cooperative Nurseries provide considerable support to the PFBC's ATW program. Additional PFBC support of this program is warranted.

Strategies:

- Annually review the Cooperative Nursery program with an emphasis on optimizing production capacity at individual facilities and adding additional nurseries.
- Evaluate production capacity at existing facilities and investigate all requests to establish new nurseries.
- Assess wastewater handling practices at each nursery. Provide technical assistance and increased funding to improve nursery effluent water quality.
- Provide recognition to dedicated, properly operating cooperative nursery units.
- Investigate a means to provide for more flexibility into how PFBC grant money can be utilized by coops.
- Develop a more effective working relationship with the coop nurseries to

maximize the efficiency of the fish they raise as a component to the overall stocked trout program.

- Develop a more efficient real-time reporting system for the Coop nurseries as well as an electronic database to effectively track and manage coop nursery stocking information.
- Investigate distributing coop nursery stocking schedules via the PFBC website and other media to provide enhanced angling opportunities.

Issue 15: The cost to operate the stocked trout program is significant and as such, the PFBC must investigate ways to optimize hatchery operations and program efficiency.

Strategies:

- Limit trout production cost increases to the greatest extent feasible.
 - Utilize the computerized trout production program to improve the efficiency of fish feed use.
 - By 2014, purchase mechanical egg pickers and fish pumps to reduce labor costs in incubating trout eggs and moving fish between rearing units.
 - By 2014, investigate the use of technological advancements as well as part-time employees instead of full-time staff to further limit increases in overall costs.
- Beginning in the 2011-12 fiscal year, conduct a study in cooperation with the USFWS Northeast Fishery Center to genetically identify current brood strains used at PFBC hatcheries. Results will be used to plan future production with available brood lines and/or introducing new strains into the trout production system as part of a comprehensive broodstock management plan.
- Optimize the trout distribution system in order to decrease the current cost of trout production.
 - By January 2010, analyze post-stocking data to determine the percentage of trips made with distribution trucks at full capacity and reconfigure stocking assignments and schedules to maximize full capacity truck trips.
 - By January 2010, contract with the Department of Supply Chain and Information Systems at Penn State to conduct an analysis of our distribution assignments and travel routes. Stocking assignments, schedules, and travel routes will be revised pending results of this study.
- By January 2011, develop stocking program modifications based on the 2008 stocked trout cost study. Possible options include:
 - Eliminate stream sections from the stocking program that have negative cost/benefit ratios.
 - Evaluate the cost/benefit of the fall and early-winter stocked trout program and adjust the program if not cost effective.
 - To reduce transportation costs and concentrate stocking during the period of highest angler use, concentrate inseason stocking during the

- first three weeks of the spring inseason stocking period.
- Reduce the number of stream sections that receive inseason stockings based on low inseason use or on the proximity of other inseason stocked trout stream sections

Issue 16: Maintaining free public access to Pennsylvania’s stocked trout fisheries is important to maintain Pennsylvania’s angling heritage.

Strategy:

- Improve public access to at least 10 stocked streams with no wild trout reproduction between 2010 and 2014. Access improvements may include, but are not limited to improved parking areas, long-term access easements, and purchase of riparian lands.
 - Work with PFBC access coordinators to create greater public awareness of the need to secure public access; be proactive in pursuing landowner easements along streams with no wild trout reproduction.
 - Whenever possible, on stocked trout streams with PFBC assisted habitat improvement projects, assure public access as well as parking and signage that encourages use of the site and provides information on the benefits of the project.
 - By December 2010, develop a program to better acknowledge and show appreciation to private landowners who allow habitat improvement work and public access on their land.

Issue 17: Success of the stocked trout program requires that a significant proportion of the trout that are stocked into a water are available to anglers to catch when the season is opened. There have been problems identified with the residency of stocked trout in some waters.

Strategies:

- By December 2014, assess 100 approved trout waters where residency problems are suspected.
- By April 2011, report on sampling and analysis conducted to determine total and dissolved aluminum concentrations in streams that have exhibited consistent trout residency problems to determine if this factor is playing a role in trout residency in Pennsylvania streams.
- By April 2011, identify the minimum level of trout residency that a stream section must achieve for continued preseason stocking.

Issue 18: Recent generations are increasingly disconnected from the Commonwealth’s aquatic resources.

Strategies:

- By December 2012, investigate the feasibility and social acceptance of developing new trout fishing opportunities for individuals, families and

children.

- Continue to work with Trout Unlimited to expand the Trout in the Classroom program.
- Investigate the feasibility of developing a new angler mentoring program.

Issue 19: Fingerling trout stocking may provide an opportunity to provide fisheries of high quality at lower costs than stocking with adult trout in some circumstances. Our knowledge of the success of fingerling trout stocking programs in streams to meet management objectives is inadequate.

Strategies:

- By December 2010, develop a set of minimum criteria that a must be attained for the continuation of fingerling stocking in a water.
- By December 2014, evaluate all current fingerling stocking efforts and provide recommendations on the continuation and possible expansion/reduction of these programs.
- By December 2014, conduct chemical water quality analyses and habitat analyses on additional waters with potential to be managed using stocked fingerlings. For those waters that meet adequate year-round water temperatures, physical habitat, and/or biological characteristics, attempt to establish new fingerling stocked fisheries.

CHAPTER 5

LAKES MANAGED FOR TROUT

The PFBC manages 120 one-story lakes with annual plantings of catchable trout. Most of the lakes (63 lakes) are managed under Commonwealth Inland Waters regulations where statewide season, size, and creel limits apply. A total of 44 lakes are managed under the Early Season Trout-Stocked Waters program, where angling is permitted under extended season regulations through March 31. In addition, 13 lakes are managed as approved trout waters open to year-round fishing.

For the purpose of allocating trout, lakes are categorized into five classes based on the surface area of the lake. Lake classes range from small (Class 1) lakes and ponds less than or equal to 20 acres to larger (Class 5) lakes greater than 200 acres (Table 7). The allocation strategy also takes into consideration human population density in the townships, municipalities and watersheds surrounding the lake. Based on PFBC angler survey data, the highest amount of angler use per trout stocked occurs on small lakes located near dense population centers. Typically, angler use per trout stocked declines as lakes increase in size and as human population density decreases. Therefore, as lake size increases and human population density decreases stocking rates are stepped down accordingly.

Table 7. Number of adult trout stocked lakes by Lake Class.

Lake Class	Acres	Number of Adult Trout Stocked Lakes
1	≤ 20	47
2	$> 20 - \leq 50$	34
3	$> 50 - \leq 100$	20
4	$> 100 - \leq 200$	17
5	> 200	2

Two-story lakes (Table 8) are those which contain a hypolimnion that is large enough, has cold enough water, and high enough dissolved oxygen levels in the summer to maintain trout year-round. The most common strategy for providing year-round trout fisheries in two-story lakes in Pennsylvania is through fingerling trout stocking. Adult trout stocking in two-story

lakes is necessary when some factor or combination of factors precludes fingerling plantings from developing a population capable of supporting a directed fishery. The PFBC manages the trout component of most two-story lakes under statewide angling regulations. The exceptions are Lake Marburg, Duck Harbor Pond, Upper Woods Pond, and Harveys Lake. Lake Marburg and Duck Harbor Pond are approved trout waters open to year round fishing, Upper Woods Pond is managed under the Early Season Trout-Stocked Waters program, and Harveys Lake is managed with a miscellaneous special regulation that allows for a three trout per day creel limit with only one of those trout allowed to exceed 18 inches. The intent of this regulation is to maximize the lake's trophy trout potential.

Three two-story lakes currently receive plantings of both fingerling and adult trout: Lake Winola, Duck Harbor Pond, and Upper Woods Pond. At Lake Winola, the fingerling planting is experimental. If evaluations demonstrate that fingerling stocking makes a significant contribution to the fishery, managers will reduce or eliminate adult stocking. The situation at Duck Harbor Pond and Upper Woods Ponds is different. Adult trout stocking provides the vast majority of angling opportunities in these waters. Fingerling stockings are supplemental to the adult program and are not expected to produce significant put-grow-take fisheries on their own.

Table 8. Pennsylvania lakes managed as two-story fisheries.

Water	County	Acres	Species	Life stage
Allegheny Reservoir	Warren	12,081	Brown and Rainbow	Fingerlings Only
Beaverdam Run Reservoir	Cambria	360	Brook	Fingerlings Only
Beltzville Lake	Carbon	946	Brown	Fingerlings Only
Duck Harbor Pond	Wayne	228	Brown	Fingerlings and Adults
Harveys Lake	Luzerne	658	Brown	Adults Only
Hinckston Run Reservoir	Cambria	104	Brown and Rainbow	Fingerlings Only
Lake Marburg	York	1,275	Brown and Rainbow	Adults Only
Lake Wallenpaupack	Pike	5,698	Brown	Fingerlings Only
Lake Winola	Wyoming	198	Brown and Rainbow	Fingerlings and Adults
Laurel Creek Reservoir	Mifflin	67	Brown	Fingerlings Only
Quemahoning Reservoir	Somerset	899	Brown	Fingerlings Only
Upper Woods Pond	Wayne	80	Rainbow	Fingerlings and Adults

Goals

The goals of trout management in trout stocked lakes are to:

1. Enhance angling diversity and provide recreational trout angling opportunities through the stocking of adult trout.
2. Provide year-round angling opportunities for trout in two-story lakes.
3. Provide a trophy trout fishery.

Stressors and Threats

The major stressors and threats to Pennsylvania's trout stocked lakes include water quality degradation due to increased sedimentation and nutrient runoff related to road construction, urbanization, and poor agricultural practices. This can lead to eutrophication, which ultimately results in reduced dissolved oxygen levels, elevated water temperatures earlier in the season, and increased aquatic plant growth. These conditions can reduce the length of time that a lake can provide suitable conditions for trout angling. Other threats include the introduction of aquatic invasive species, acidification from acid deposition, the loss of angling opportunities resulting from the dewatering of Pennsylvania's aging dams for maintenance and safety purposes, and loss of public access on privately owned lakes.

Opportunities

Addressing the sources of eutrophication on trout-stocked lakes requires collaboration with other government agencies, conservation groups, county conservation districts, private lake associations and private individuals to ensure that the best management practices are being followed to reduce the negative effects of sedimentation and nutrient runoff stemming from agriculture, development, road construction, and urbanization. Angling opportunities can be enhanced on infertile trout stocked lakes through cooperative efforts designed to mitigate the negative effects of acidification. Partnerships with other government agencies, conservation groups, and private individuals can also provide an avenue for funding to improve angler access to lakes through long-term public easements or the outright purchase of lakeshore property.

Efforts have been underway to educate law makers with respect to the need for a dedicated source of funding to address important infrastructure needs. These efforts have

included funding for dam repair. Efforts to secure dedicated funds to maintain Pennsylvania's lake resources should continue.

Currently, a total of 46 trout-stocked lakes are managed under the Early Season Trout-Stocked Waters program. Under this program, angling is permitted through the month of March under extended season regulations and a period of closure applies from April 1 until 8:00 am on the opening day of regular trout season. Opening these lakes to a year-round season could benefit anglers and the trout stocking program, as well. The provision of a year-round season would address the concern some anglers have with a closed season on these lakes, as typically the closed season coincides with a time period when anglers are interested in fishing for panfish and other warm/coolwater species on these waters. Currently, all waters managed under the Early Season Trout-Stocked Waters program receive their preseason stocking between April 1 and the opening day of regular trout season. The change to a year-round season would allow stocking to occur earlier on these lakes. This would make approximately 40 distribution trips available for use in early to mid-April. These distribution trips could be better used to stock streams with stocked trout residency problems closer to the opening day of regular trout season.

Currently, the PFBC has little knowledge of fingerling trout stocking success or angler use and harvest in lakes. Surveys designed to measure these variables will provide the data needed to produce better fisheries through the manipulation of stocking rates, life stages stocked, species compositions, and selection of angling regulations.

Public education is the main weapon for preventing the spread of aquatic invasive species. The PFBC has recently placed informational signs at boat ramps, featured the topic on its website and in its publications, and collaborated with other agencies in public education efforts. The PFBC has also passed regulations that make the possession, introduction, or transportation of such species illegal. The PFBC is a member of the Pennsylvania Invasive Species Council, and is working closely with Sea Grant, which is currently developing a statewide plan to address these issues.

The following strategies are designed to address the highest priority threats and opportunities to the Commonwealth's one and two-story lakes managed with stocking of catchable trout. Many of the issues related to water quality protection and invasive species were addressed in previous chapters and will not be repeated here.

Strategies

The following strategies are designed to address the highest priority threats and opportunities to the Commonwealth's one and two-story lakes as they pertain to the management of trout.

Issue 20: Maintaining free public access to Pennsylvania's lakes is important to maintain Pennsylvania's angling heritage.

Strategy:

- Improve public access to at least 10 lakes between 2010 and 2014. Access improvements may include, but are not limited to improved parking areas, long-term access easements, and purchase of riparian lands.
 - Work with PFBC access coordinators to create greater public awareness of the need to secure public access; be proactive in pursuing landowner easements along and access to privately owned lakes.
 - By December 2010, develop a program to better acknowledge and show appreciation to private landowners who allow habitat improvement work and public access on their land.

Issue 21: The cost to operate the stocked trout program on lakes is significant and as such the benefits of providing recreational angling opportunities with stocked trout should, at a minimum, equal the costs.

Strategies:

- By January 2011 develop stocking program modifications on trout stocked lakes based on the 2008 stocked trout cost study. Possible options include:
 - Eliminate lakes from the stocking program that have negative cost/benefit ratios.
 - Stock trout in waters that receive better angler use, or in the cases of new waters, those that are anticipated to receive better usage.
 - To reduce transportation costs and concentrate stocking during the period of highest angler use, concentrate inseason stocking during the first three weeks of the spring inseason stocking period.
 - Reduce the number of lakes that receive inseason stockings based on low inseason use or on the proximity of other inseason stocked trout waters.

- By June 2014, conduct angler surveys to provide a statewide assessment of spring angler use, angler catch, angler opinions, and an economic contribution of trout angling on trout stocked lakes in order to make informed decisions regarding future trout stocking allocations in lakes.

Issue 22: The Early Season Trout Stocked Waters program is the biggest obstacle to stocking more streams closer to opening day and thus minimizing trout residency problems. Nevertheless, the program is very popular among trout anglers and among anglers who fish for other species such as perch and crappie.

Strategy:

- By January 2010, provide an analysis and recommendations for the possible elimination of the Early Season Trout –Stocked Waters program and moving the waters in this program into either the Approved Trout Waters Open to Year Round Fishing program or the Approved Trout Waters program.

CHAPTER 6

TROUT MANAGEMENT IN LAKE ERIE

Contemporary trout management on Lake Erie includes the goal of restoring native lake trout and providing recreational angling opportunities through the stocking of steelhead strain rainbow trout (hereafter referred to as steelhead) and brown trout.

Endemic stocks of lake trout have been extirpated from Lake Erie since 1965. Restoration efforts were initiated by the PFBC when 17,000 yearling lake trout were stocked in 1969. This effort was expanded in 1982, when the PFBC, in partnership with the USFWS Service and the NYDEC committed to stocking 160,000 yearling lake trout annually, with the ultimate goal of establishing a self sustaining population (Markham et. al, 2008). An extensive review of this effort can be found in the Lake Erie Lake Trout Management Plan at <http://www.glf.org/pubs/SpecialPubs/2008-02.pdf>.

Current steelhead stocking objectives for the PFBC are one million yearling smolts annually, with the primary goal of providing an attractive seasonal trophy fishery in the tributaries to Lake Erie. The steelhead program is recognized as a put-grow-take fishery that is maintained exclusively through stocking. The program is sustained through the collection of sexually mature steelhead at Trout Run and Godfrey Run. Artificial spawning takes place at the Fairview State Fish Hatchery. Fertilized eggs are transferred to and hatched at the Tionesta State Fish Hatchery. Fingerling steelhead are then reared for approximately 15 months at Tionesta SFH (600,000), Fairview SFH (300,000) and Linesville SFH (100,000). Additional steelhead fingerlings or fertilized eggs are also supplied to the local sportsman's cooperative nurseries to augment PFBC production, which result in an additional 100,000 steelhead smolts annually. Stocking location and relative stocking intensity are based on the proportional distribution of public access, angler effort and the perpetuation of feral brood into the nursery streams. In 2008, thirteen tributaries and Presque Isle Bay were stocked with a total of 1,220,934 steelhead yearlings (Figure 8). A comprehensive evaluation of this fishery in 2003 -2004 estimated that anglers direct over 200,000 angling trips for steelhead annually in Pennsylvania (Murray and Shields, 2004). Opinion surveys taken during this study showed overwhelming support for

supplemental funding to secure or improve angler access through a special stamp or permit program. As a result of this feedback, and strong support of local angling groups, a Lake Erie permit was established in 2005. Revenue from this source is dedicated to acquiring new access and enhancing existing access on the Pennsylvania portion of Lake Erie and the tributaries through the Erie Access Improvement Grant Program (EAIGP)

In 2008, the PFBC, in collaboration with local Sportsman's cooperative nurseries, have initiated a put-grow-take brown trout stocking program on Lake Erie. The objectives of this effort are to increase the diversity of the Erie tributary fishery, enhance the open lake boat fishery, and create a near shore spring fishery by stocking 50,000 - 100,000 yearling brown trout annually. The program was started with donation of 100,000 certified disease free brown trout eggs by the NYDEC. The NYDEC has agreed to continue providing eggs for this program for several years, based on available surplus. During this period, the PFBC expects to develop a self-sustaining source of brown trout eggs for the continued support of this program. Fish will be stocked in the nursery streams and Presque Isle Bay to minimize angler induced mortality of incidentally caught juvenile brown trout. The first stocking of the put-grow-take brown trout took place in May, 2009 with fish from the local sportsman's cooperative nurseries. The PFBC will follow that stocking event with a fall planting of fish in October 2009. The PFBC will fin clip these fish so that relative survival and stocking strategies can be evaluated. Future plants of both cooperative nursery and PFBC brown trout will be fin clipped for at least three years to measure the success of this program. Information will be garnered through creel surveys, existing assessment programs and when conducting steelhead brood stock collections in the nursery streams.

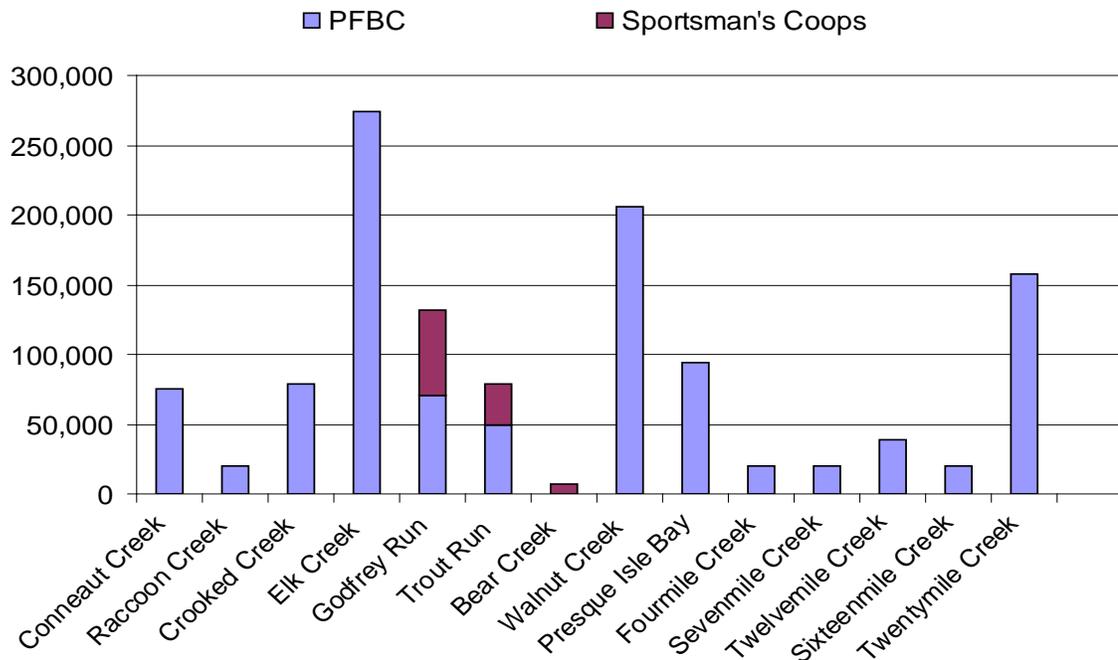


Figure 8. Total (PFBC + Sportsman's Cooperative Nurseries) steelhead stocking by location in 2008.

Goals

The goals of trout management in Lake Erie are to:

1. Restore stocks of native lake trout
2. Provide recreational angling opportunities through the stocking of steelhead and brown trout

Stressors and Threats

Aquatic invasive species (AIS) have posed a risk to the upper Great Lakes since the Welland Canal was created in 1829. The problem was exacerbated with the completion of the St. Lawrence Seaway in 1959. These actions not only allowed for the direct passage of sea lamprey above Niagara Falls, but also increased maritime transport and introduction of non-native aquatic species from other ports around the world through ballast water transfer. There are currently over 180 nonindigenous species in the Great Lakes including sea lamprey, rainbow smelt, alewife and round gobies, which have all demonstrated direct negative impact on the capacity to restore lake trout in Lake Erie. Additionally, it is assumed that viral hemorrhagic septicemia (VHS) was also introduced to the Great Lakes through this vector. This disease is a

major threat to the perpetuation of Lake Erie trout fisheries, especially to the feral broodstock program in Pennsylvania. In addition to VHS, a suite of other contagions including infectious pancreatic necrosis (IPN), infectious hepatic necroses (IHN), and bacterial kidney disease (BKD) could impart serious consequences to the production facilities currently rearing trout for the Lake Erie program including steelhead and brown trout.

Another risk to the continued success of Pennsylvania's potamodromous (migrates within freshwater) trout fishery is sustained public access to the Lake Erie tributaries. Access to the Erie tributaries continues to be threatened by posting of private lands, and loss due to private leases secured by commercial enterprises and exclusive angling groups

Opportunities

Maintaining access on waters currently open to fishing and opening new public access areas to Lake Erie and its tributaries is vital to the continued participation and growth of trout fishing in the Commonwealth. Opportunities exist to expand angler access to Lake Erie and its tributaries through the wise application of the Lake Erie Access Improvement Program. Further improvement in access may be realized through partnerships with conservation groups and private individuals, which can prove beneficial in securing long-term public easements or purchasing riparian lands to provide public access. Cooperative efforts such as landowner recognition programs could be used to improve landowner relations. Furthermore, it is recognized that extensive angler use on private lands open to public fishing has the potential to result in that land being posted against trespass. Opportunities exist to promote the use of less used angling areas on Lake Erie tributary streams and to open up new areas through the removal of instream structures that block the upstream migration of fish.

Strategies

The following strategies are designed to address the highest priority threats and opportunities to Lake Erie as they pertain to the management of trout.

Issue 23: The PFBC does not have a long term source of disease free brown trout eggs or an isolated facility to raise fingerling brown trout for stocking Lake Erie. Addressing these issues is critical to the development of an expanded Lake Erie brown trout fishery within the guidelines of the Great Lake Fish Health Advisory Committee.

Strategies:

- By 2013, develop an in-house source of disease free brown trout eggs.
- By 2013, develop an isolated rearing facility capable of raising 75,000 brown trout fingerlings for stocking into the waters of Lake Erie.
- Strictly adhere to the Great Lakes Fish Disease Control Policy and Model Program supplied through the Great Lakes Fish Health Committee.

Issue 24: Maintaining public access to Pennsylvania's portion of Lake Erie is important to maintain Pennsylvania's angling heritage.

Strategy:

- Improve public access to Lake Erie and its tributaries. Access improvements may include, but are not limited to improved parking areas, long-term access easements, and purchase of riparian lands.
 - Work with PFBC access coordinators to create greater public awareness of the need to secure public access; be proactive in pursuing landowner easements along and access to privately owned tributary corridors.
 - By December 2010, develop a program to better acknowledge and show appreciation to private landowners who allow habitat improvement work and public access on their land.

Issue 25: Invasive species and disease pathogens such as didymo, round goby, zebra mussels, and VHS threaten our trout fisheries.

Strategies:

- Continue to work with the Great Lakes Fishery Commission to ensure the effective suppression of the sea lamprey population in Lake Erie to allow for the restoration of lake trout and improved survival of stocked salmonids.
- By December 2010, implement effective outreach and education priorities identified in the Aquatic Invasive Species Management Plan.
- Fully implement the agency's new biosecurity policy in 2010.
- Work with federal agencies, neighboring states, and other Pennsylvania state agencies to establish regulations to help reduce the introduction of new AIS and control the spread of established AIS in the Great Lakes.

LITERATURE CITED

- Buss, K. 1967. Justification for Coho Project on Lake Erie. Pennsylvania Fish Commission: Division of Fisheries. PFBC Files, Bellefonte, PA.
- Duda, M. D., M. Jones, T. Beppler, S.J. Bissell, A. Criscione, B. Hepler, J. B. Hepler, A. Richie, C. L. Schilli, T. Winegood, and A. Lanier. 2008. Pennsylvania trout fishing survey. Responsive Management, Harrisonburg, VA.
- Greene, R., R. Weber, R. Carline, D. Diefenbach, M. Shields, M. Kaufmann, R. Moase, and B. Hollender. 2005. Angler use, harvest and economic assessment on wild trout streams in Pennsylvania. PFBC Files, Bellefonte, PA.
- Greene, R., R. Weber, R. Carline, D. Diefenbach, and M. Shields. 2006. Angler use, harvest and economic assessment on trout stocked streams in Pennsylvania. PFBC Files, Bellefonte, PA. 51 pp.
- Hummon, N.P. 1992. The 1991 trout angler telephone survey. University Center for Social and Urban Research, University of Pittsburgh. Pittsburgh, PA..
- Markham, J.L., Cook, A., MacDougall, T., Witzel, L. Kayle, K., Murray, C., Fodale, M., Trometer, E., Neave, F., Fitzsimons, J. Francis, J. Stapanian, M. 2008. A strategic plan for the rehabilitation of lake trout in Lake Erie, 2008-2020. Great Lakes Fish. Comm. Misc. Publ.2008-02.
- Murray, C. K. and R.L Hoopes. Pennsylvania's Lake Erie Coho Salmon Fishery. Pennsylvania Fish and Boat Commission. Division of Research. Lake Erie Research Unit. Fairview, PA.
- Murray, C. K., and M. Shields. 2004. Creel analysis and economic impact of Pennsylvania's Lake Erie tributary fisheries in Erie County, Pennsylvania, with special emphasis on landlocked steelhead trout (*Oncorhynchus mykiss*). Pennsylvania Fish and Boat Commission. Lake Erie Research Unit. Fairview, PA..
- Pennsylvania Department of Environmental Protection (Pa. DEP). 2003. Water Quality Antidegradation Implementation Guidance, Document Number 391-0300-002.
- Pennsylvania Department of Environmental Protection (Pa. DEP). 2006. Pennsylvania Integrated Water Quality Monitoring and Assessment Report. PA DEP file report, Harrisburg, PA.
- Pennsylvania Fish and Boat Commission (PFBC). 2007. Pennsylvania's brook trout conservation strategies. PFBC Files, Bellefonte, PA.
- Weber, R., R. T. Greene, J. Arway, R. S. Carney, and L. Young. 2008. History of the management of trout fisheries in Pennsylvania. PFBC Files, Bellefonte, PA.

APPENDIX A
Summary of Issue Statements

Issue Statements	Chapter			
	3	4	5	6
	Wild Trout	Trout Stocked Streams	Trout Stocked Lakes	Lake Erie
1. The PFBC has not assessed all of the streams throughout the Commonwealth. As a result, the total number of streams that support wild trout populations in Pennsylvania is unknown, which leads to inadequate protection for these streams. The PFBC does not currently have the ability to assess these most at-risk streams at a rate that outpaces the rate of degradation.	X			
2. There are a number of streams that may hold Class A biomass trout populations that have not been officially designated as Class A streams by the PFBC. This leads to inadequate water quality protection for these waters and inconsistent application of fisheries management strategies.	X			
3. Currently, the PFBC stocks adult trout in a total of 80 stream sections that support at least a minimum Class B wild trout biomass. There may be the potential to improve the wild trout biomass on some of these waters through the cessation of stocking.	X			
4. Anglers, as well as the general public, do not have an adequate understanding of the classification system used to define wild trout populations throughout the Commonwealth.	X			
5. The cumulative effects of human development have been inadequately addressed in permitting actions.	X			
6. Invasive species and disease pathogens such as, didymo, round goby, zebra mussels, and VHS threaten our trout fisheries.	X			
7. Maintaining free public access to Pennsylvania's wild trout fisheries is important to provide trout angling opportunities.	X			
8. The expansion of wild trout populations is impeded in streams where habitat has been identified as the primary limiting factor. Furthermore better knowledge of the effects of habitat manipulations on wild trout populations is needed.	X			
9. Through their ability to impede movement, trap sediment and increase water temperatures barriers remain a deterrent to fully functional wild trout streams.	X			
10. Impairment of the natural flow regime through water withdrawals and reservoir operations threatens the quality of wild trout waters.	X			

11. Criteria for the inclusion of waters into special regulation programs for trout fisheries are lacking and the degree to which special regulation programs are meeting management objectives needs to be fully evaluated.	X			
12. New and innovative technology is needed to ensure protection of aquatic resources downstream of PFBC trout hatcheries.		X		
13. PFBC hatchery water quality and quantity will affect future operational capability.		X		
14. Cooperative Nurseries provide considerable support to the PFBC's ATW program. Additional PFBC support of this program is warranted.		X		
15. The cost to operate the stocked trout program is significant and as such, the PFBC must investigate ways to optimize hatchery operations and program efficiency.		X		
16. Maintaining free public access to Pennsylvania's stocked trout fisheries is important to maintain Pennsylvania's angling heritage.		X		
17. Success of the stocked trout program requires that a significant proportion of the trout that are stocked into a water are available to anglers to catch when the season is opened. There have been problems identified with the residency of stocked trout in some waters.		X		
18. Recent generations are increasingly disconnected from the Commonwealth's aquatic resources.		X		
19. Fingerling trout stocking may provide an opportunity to provide fisheries of high quality at lower costs than stocking with adult trout in some circumstances. Our knowledge of the success of fingerling trout stocking programs in streams to meet management objectives is inadequate.		X		
20. Maintaining free public access to Pennsylvania's lakes is important to maintain Pennsylvania's angling heritage.			X	
21. The cost to operate the stocked trout program on lakes is significant and as such the benefits of providing recreational angling opportunities with stocked trout should, at a minimum, equal the costs.			X	
22. The Early Season Trout Stocked Waters program is the biggest obstacle to stocking more streams closer to opening day and thus minimizing trout residency problems. Nevertheless, the program is very popular among trout anglers and among anglers who fish for other species such as perch and crappie.			X	
23. The PFBC does not have a long term source of disease free brown trout eggs or				X

<p>an isolated facility to raise fingerling brown trout for stocking Lake Erie. Addressing these issues is critical to the development of an expanded Lake Erie brown trout fishery within the guidelines of the Great Lake Fish Health Advisory Committee.</p>				
<p>24. Maintaining free public access to Pennsylvania's portion of Lake Erie is important to maintain Pennsylvania's angling heritage.</p>				X
<p>25. Invasive species and disease pathogens such as, didymo, round goby, zebra mussels, and VHS threaten our trout fisheries.</p>				X