



Pine Creek Fisheries Management Plan



www.fishandboat.com/PineCreekPlan.htm

March 2012

This work made possible by funding from the Sport Fish Restoration Act Project F-57-R Fisheries Management.

**PENNSYLVANIA FISH & BOAT COMMISSION
BUREAU OF FISHERIES
FISHERIES MANAGEMENT DIVISION**

Pine Creek (309A)
Sections 01-13
Fisheries Management Plan

Prepared by
Jason Detar and Dave Kristine
Fisheries Management Area 3

Introduction

Carving its way through the mountains of Potter, Tioga, and Lycoming counties, Pine Creek is the second largest tributary (based on watershed size) to the West Branch Susquehanna River (Figure 1). The Pine Creek watershed is resplendent with a bounty of natural resources. It is primarily forested and publicly owned and drains 2,536 sq km (979 sq miles). The free-flowing mainstem of Pine Creek which anchors this predominantly wild and relatively undeveloped region of northcentral Pennsylvania is a special destination for anglers and outdoor recreationists alike and truly is a Commonwealth treasure as evidenced by its 1992 classification as a Scenic River under the Pennsylvania Scenic River Act. Since the 1930's, the Pennsylvania Fish and Boat Commission (PFBC) has managed the diverse fisheries in all portions of Pine Creek from its small, cold headwaters downstream through the well known "Grand Canyon of Pennsylvania" reaches and beyond to where the warmer, broad waters enter the West Branch Susquehanna River in Jersey Shore. The diversity of physical, chemical, biological, and social features along Pine Creek, like other streams in the state, has necessitated the division of this water into various sections for fisheries management purposes. Through an adaptive management process, the sectioning strategy for Pine Creek has changed over time and currently is represented by 13 management sections (Table 1, Figure 2). While these changes have been documented in management reports for various sections, there has not been a single concise overview of the fisheries management for the entire mainstem of Pine Creek.

Therefore, the purpose and primary focus of this document is to provide an organized view of the historic and current state of fish populations, water quality, and fisheries management for the entire mainstem of Pine Creek, a review of the fishery resources in the tributaries, and provide guidance for future management direction. The Pine Creek management plan includes the following information:

- 1) Description of the physical and morphological characteristics of Pine Creek and its watershed
- 2) Review of the natural resource oriented plans available for Pine Creek
- 3) Review of the Pennsylvania Code Chapter 93 water quality designations for Pine Creek
- 4) Review of past examinations of fishery resources and related biological surveys in Pine Creek
- 5) Description of fish communities and their abundances in various mainstem management sections and an overview of other fishery resources in the watershed
- 6) Evaluation of water temperature data for Pine Creek
- 8) Discussion of trout thermal issues on Pine Creek
- 9) Review of the 2008 angler use, harvest, and opinion survey conducted on Pine Creek by the Pennsylvania Department of Conservation and Natural Resources, Penn State University and PFBC
- 10) Summary
- 11) Future direction
- 12) Management recommendations
- 13) References
- 14) Tables
- 15) Figures
- 16) Appendix A. PFBC position statement regarding the closure of coldwater tributary stream mouths to angling during summer months
- 17) Appendix B. Angler Use, Catch, Harvest, Opinion and Preference Survey on Pine Creek (309A), Sections 11-13, April-October 2008 compiled by PFBC
- 18) Appendix C. Pine Creek Angler Survey 2008-2009 project report compiled by PSU

Pine Creek Watershed Physical Description and Morphological Characterization

Pine Creek is a 138 km (87 mile) long stream which originates as a small, coldwater brook trout stream near Brookland, Potter County and flows east to Ansonia then in a southerly direction through Tioga, Lycoming, and Clinton counties to its confluence

with the West Branch Susquehanna River at Jersey Shore. While originating as a small coldwater stream, Pine Creek rapidly becomes a fourth order stream by river mile (RM) 84 (confluence with an unnamed tributary at Brookland), fifth order stream by RM 73 (confluence with West Branch Pine Creek in Galeton), and is sixth order from RM 41 (confluence with Babb Creek in Blackwell) to its mouth. Likewise, the stream quickly becomes wide, averaging 4.8 m (15.7 ft) in width in the headwater section and tripling in size only 13.5 km (8.4 miles) downstream of its source and eventually averages 74.4 m (244.1 ft) in width near the mouth. As Pine Creek's size rapidly increases as one moves downstream from its headwaters, its water temperature also rapidly increases during the summer months. Fourth order tributaries include (length in km/miles, drainage in sq km/sq miles): West Branch Pine Creek near Galeton (27 km/17 miles, 184 sq km/71 sq miles), Elk Run near Watrous (10 km/6 miles, 54 sq km/21 sq miles), Marsh Creek at Ansonia (24 km/15 miles, 212 sq km/82 sq miles), Cedar Run (18 km/11 miles, 98 sq km/38 sq miles), and Slate Run (11 km/7 miles, 117 sq km/45 sq miles). Fifth order tributaries include Babb Creek near Blackwell (34 km/21 miles, 207 sq km/80 sq miles) and Little Pine Creek at Waterville (24 km/15 miles, 466 sq km/180 sq miles).

Almost the entire watershed is located within the Appalachian Plateau physiographic province, Deep Valley Section. The underlying geology of this section consists mainly of sandstone, siltstone, shale, conglomerate, and coal and is characterized by many very deep, steep-sloped valleys that are separated by narrow, flat to sloping uplands (DCNR 2010). Marcellus Shale, which contains an abundance of natural gas is also prevalent within the watershed and as of September 2011 approximately 200 wells have been drilled in the watershed and approximately 557 permits have been issued for new wells. Almost the entire watershed is also located within the North Central Appalachian ecoregion which is characterized by extensive forests, a short growing season, nutrient-poor residual soils, high local relief, nearly horizontal strata, and resistant rock (Woods et al. 1999). The soils, climate, and ruggedness make the area well suited to trees and poorly suited to agriculture (Woods et al. 1999). Most of the soils are low in fertility, often steep, stony, and acidic, and were derived from noncarbonate sedimentary rock. These provinces and regions are also described as having long winters, a cool, humid climate, and short growing season (DCNR 2010, Woods et al. 1999). These abiotic influences have a profound effect on the communities and abundances of fish found throughout the watershed and are

reflected in the overall good but infertile nature of water quality (Table 2).

Over half of the 2,536 sq km/979 sq mile watershed (approximately 1,326 sq km/512 sq mile), is in public ownership. These lands include four state forests, six state parks, and seven tracts of State Game Lands. State Forests include Tiadaghton, Tioga, Susquehannock, and Sproul. State Parks include Cherry Springs, Colton Point, Denton Hill, Leonard Harrison, Little Pine, Lyman Run, Patterson, and Upper Pine Bottom. State Game Lands (SGL) include SGL 64, 68, 75, 208, 268, and 313. Perhaps the most outstanding and unique natural feature through which the mainstem of Pine Creek flows is the 25-mile long Pine Creek Gorge. At Colton Point, near the northern end of the gorge, the gorge depth is approximately 244 m (800 ft), while the width in this area averages 1,220 m (4,000 ft), rim to rim. The gorge becomes deeper and wider near the southern end (DCNR 2005). At Waterville the canyon reaches its maximum depth of 442 m (1,450 ft; DCNR 2005). The Pennsylvania Grand Canyon portion of the gorge between Ansonia and Blackwell has been recognized as a National Natural Landmark. Perhaps the most recognizable recreational feature along Pine Creek today is the 100 km (62 mile) long Pine Creek Trail extending from Ansonia to Jersey Shore, a former rail line converted into a multi-use trail for biking, hiking, cross country skiing, and portions for horseback riding. The trail also provides for excellent angling access to Pine Creek.

Pine Creek Resource Plans

The following resource plans are available for Pine Creek where numerous more details for the physical and social characteristics of the mainstem and tributaries are available:

Pine Creek Wild and Scenic River Study (1978)

Prepared under the authority of the National Wild and Scenic Rivers Act of 1968 this report found that Pine Creek from Ansonia to Torbert qualified and met the criteria as a component of the National Wild and Scenic Rivers System and that Pine Creek could best be protected and managed through limited acquisition and development of facilities by the Commonwealth. It was recommended that Pine Creek be designated as a component of the Pennsylvania Scenic Rivers System and the Governor of Pennsylvania was encouraged to apply for national designation. State designation was obtained but not national designation. No

specific fisheries management issues were mentioned in the document.

Pine Creek Scenic Rivers Study (1989)

The Pennsylvania Department of Environmental Resources (now Department of Conservation and Natural Resources; DCNR) opposed Federal designation of Pine Creek for various reasons and prepared this report with recommendations to the Governor and State Legislature that reaches of Pine Creek be included in the State Scenic River's Program which was made official in 1992. No specific fisheries management issues were discussed in the document.

Pine Creek Valley Management Plan (1996)

The Pine Creek Valley Study team was originally convened in the fall of 1989 to assess the impacts of existing and forecasted recreational use, facility development, and growth on the resources of the Pine Creek Valley in light of the Scenic River's designation and also the proposed and now completed Rail Trail. The plan was intended to provide direction and assign responsibilities for near term activities to address existing concerns and to evaluate and respond to future impacts. Water protection issues are discussed in the plan but not specific fisheries management issues. This plan was a precursor to the Pine Creek Watershed River Conservation Plan.

Pine Creek Watershed River Conservation Plan (2005).

This major plan was funded by the DCNR Community Conservation Partnership Program's Rivers Conservation Program. A 19 member steering committee produced the plan which involved significant public input and provides an in depth look at: 1) issues, concerns, constraints, and opportunities concerning the watershed, 2) land resources of the watershed, 3) Water resources of the watershed, 4) biological resources of the watershed, 5) cultural resources of the watershed, and 6) management options and suggestions. Specific fisheries management suggestions included: 1) work with PFBC to review the status of fisheries management plan for Pine Creek watershed and further develop or update as needed, 2) determine the need for fish ladders on dams within the watershed and consider the use of multi-use structures (fish ladder, portage channel, kayak course) where appropriate, 3) encourage the use of public participation and involvement on any proposed changes to fishing regulations, 4) protect the trout resource in Pine Creek Watershed especially during drought and warm water conditions at the mouth of tributaries, and 5) continue to explore options to protect the wild brook trout populations in the Pine Creek

Watershed. One of the concerns of the plan was the recent development of the PA WILDS initiative, a top-down tourism and economic development program administered by DCNR and the Department of Community and Economic Development (DCED) which could potentially compromise the unique natural values of the watershed for economic development.

A Recreation Plan for the State Parks and State Forests in the Pennsylvania Wilds. Appendix 8- Pine Creek Valley Early Action Recommendations (2005).

Planning document produced by a consultant from Texas as part of the PA WILDS initiative. The appendix provides background, inventory and assessment, recreation trends and markets, recommendations, and priorities for implementation. Specific fisheries management recommendation include that DCNR work with the PFBC to expand special regulation waters designations in Pine Creek and its tributaries to encourage catch-and-release practices until later in the fishing season.

Pennsylvania Code Chapter 93 Water Quality Designation

Pennsylvania Department of Environmental Protection's (DEP) designated water quality protected uses and water quality criteria classification for the mainstem of Pine Creek is High Quality Cold Water Fishes and Migratory Fishes (HQ-CWF, MF) from the source downstream to the West Branch Pine Creek, Exceptional Value and Migratory Fishes (EV, MF) from West Branch Pine Creek downstream to Marsh Creek, and High Quality Trout Stocking and Migratory Fishes (HQ-TSF, MF) from Marsh Creek downstream to the mouth. DEP is currently reevaluating Pine Creek and a number of its tributaries to assess potential 25 PA Code, Chapter 93 Water Quality Standards upgrades and PFBC will work with DEP to assure that Pine Creek and its tributaries are afforded the highest level of protection possible under Chapter 93. As part of this reevaluation, DEP has recently upgraded the existing use classification to Exceptional Value and Migratory Fishes (EV, MF) for the mainstem of Pine Creek from Genessee Forks downstream to South Branch Pine Creek and from Marsh Creek downstream to the mouth. Therefore, the main stem of Pine Creek should receive protection as HQ-CWF from headwaters downstream to Genessee Forks and EV from Genessee Forks downstream to the mouth.

Fisheries and Related Biological Surveys of Pine Creek

Historic surveys and information

For over 130 years, from 1792 when the first sawmill was constructed until 1927 when the last tannery closed, natural resource extraction (lumber and coal) drastically altered the landscape and aquatic resources of the mainstem of Pine Creek and its watershed. The forests of large white pine and hemlock were reduced to bare ground during logging operations and subsequent thermal and physical changes to the streams from runoff, erosion and sedimentation, stream alteration, and industrial discharges has had profound and lasting effects on the fishery that the Native Americans and early European settlers utilized. There are no PFBC records prior to the industrial period but it is suspected that the tributaries and the mainstem of Pine Creek provided sufficient cold water temperatures and habitat to support brook trout *Salvelinus fontinalis* populations much greater in abundance and distribution than was found after this period and up to the present date. Additionally, anecdotal reports exist describing large runs of "silver salmon", presumably American shad *Alosa Sapidissima* as well as American eels *Anguila rostrata* in Pine Creek prior to dam construction on the lower Susquehanna River.

PFBC fishery surveys and reports beginning soon after the industrial era described the status of the Pine Creek fishery and results were very similar to those currently present. In the first documented PFBC fishery surveys of Pine Creek, Buller (1931) reported that the Potter County portion of Pine Creek (present management sections 01-04) to be a "good stream" and recommended stocking of hatchery trout. Shoemaker (1931) found the remainder of Pine Creek (sections 05-13) to be a warmwater stream commonly fished hard for black bass *Micropterus spp* and also recommended stocking of hatchery trout. Pine Creek was also classified as a warmwater stream by Snyder (1934) who similarly reported a trout fishery in the headwaters which quickly became a bass fishery a short distance downstream and was the first PFBC report to note the influence of acid mine drainage (AMD) from Babb Creek at Blackwell as well as the presence of American eel.

The main stem of Pine Creek from the mouth upstream to above Babb Creek (current management sections 09-13) was next examined by Lillie and Bradford (1954) who sampled the fishery through angling and the use of dynamite in large pools. The results of their survey found very slow growing smallmouth bass *Micropterus dolomieu*, the most abundant gamefish, along with the presence of

walleye *Sander vitreus*. Most of the fish collected by dynamiting pools were minnows *Cyprinidae* and suckers *Catostomidae*. Lillie and Bradford (1954) also documented high summer water temperatures which limited both naturally reproducing trout populations and utility of later inseason trout stockings. Additionally, Lillie and Bradford (1954) noted that AMD from Babb Creek affected Pine Creek for only a short distance downstream of the confluence.

Hesser et al. (1970) surveyed Pine Creek from the headwaters to the mouth at 20 different sites and summarized the results as:

- 1) The main stem of Pine Creek is a relatively good trout stream in its headwaters, but becomes progressively marginal for wild trout as one approaches the Galeton area.
- 2) Smallmouth bass were collected as far upstream as above the confluence with West Branch Pine Creek near Galeton and from this point downstream becomes marginal water for both trout and smallmouth bass.
- 3) Smallmouth bass abundance and growth were limited by temperature, lack of cover, and water fertility.
- 4) Continuation of hatchery trout stocking should continue in appropriate reaches.

Hesser et al. (1970) also noted the presence of American eels as far upstream as Galeton and detrimental effects from discharges and nutrient inputs near Galeton and Marsh Creek, due to inadequate wastewater treatment in Galeton and Wellsboro.

While they did not collect fish, DEP also conducted a comprehensive biological (benthic macroinvertebrates) and chemical investigation of the entire mainstem of Pine Creek during this same time period (Brezina and Sheaffer 1970) and found in general good to excellent conditions biologically in Pine Creek from headwaters to the mouth with slight to significant impacts to the mainstem from Marsh Creek (industrial discharges and sewage) and Babb Creek (AMD).

A more comprehensive fish collection was conducted by Cooper and Wagner (1971) the following year who surveyed 98 sites within the Pine Creek watershed including 19 main stem sites to further document fish species occurrence and relative abundance. Cooper and Wagner (1971) found a total of 28 different fish species to occur in mainstem sites. They also conducted population estimates for all fish species at sites located at Galeton, Blackwell, Cammal, and Jersey Shore and found densities of fish from highest to lowest to be: white sucker *Catostomus commersoni*, river chub *Nocomis micropogon*, northern hog sucker

Hypentelium nigricans, common shiner *Luxilus cornutus*, rock bass *Ambloplites rupestris*, stoneroller *Campostoma anomalum*, smallmouth bass, and margined madtom *Noturus insignis*.

Contemporary surveys

The PFBC conducted a major fishery evaluation of the entire mainstem of Pine Creek during 1978 as part of a statewide stream inventory (Hollender et al. 1978 and Marcinko et al. 1978) to collect biological (fish), chemical, physical, and social data for resource-based fisheries management. A total of 20 sites were surveyed using backpack, towed boat, and flat bottomed boat electrofishing gear. The results of the 1978 survey and those conducted later at these established sites were and still are the primary source of information in which the current fisheries management sectioning strategy is based. Fish species occurrence and relative abundance and water chemistry results from Hollender et al. (1978) and Marcinko et al. (1978) are incorporated in the following sections; however, the summary of their findings and conclusions are similar to those of Hesser et al. (1970) discussed previously. Namely, the mainstem of Pine Creek supports a very good wild trout population in its headwaters, but becomes marginal for wild trout as one approaches the Galeton area due to increased water temperatures and from this point downstream becomes marginal water for both trout and smallmouth bass.

In April 1982, a creel survey was conducted on Pine Creek for nine days following the opening day of trout season, between Cammal and Waterville (current Section 12), to determine angler use and harvest of preseason stocked trout and to estimate the ultimate return to the creel of the stocked trout (Hollender et al. 1982). Angler use (31.9 hours/ha, harvest rate (36%), and return to the creel (43%)) were found to be lower than anticipated suggesting too many trout were being stocked in one of the widest stocked streams in the state for the number of anglers fishing in the reach with recommendations to reduce the number of trout allocated to the section. Allocation was reduced in subsequent years.

A joint survey between PFBC and DEP was conducted on Pine Creek near Babb Creek in 1991 to assess AMD impacts from the Babb Creek watershed on the biota of Pine Creek (Hughey 1991) and prior to treatment of AMD in the Babb Creek watershed. While Babb Creek was still found to be biologically dead at its mouth in 1991, it was found to have no impact on fish populations in Pine Creek and only slight impairment to benthic macroinvertebrates in Pine Creek. The following year, Hughey (1992) conducted a biological (macroinvertebrates) and chemical

investigation of Pine Creek at 25 sites to update the findings of Brezina and Sheaffer (1970). Overall, good water quality and biological health in Pine Creek and tributaries was found with over 113 different taxa of benthic macroinvertebrates dominated by diverse assemblages of mayflies, stoneflies, and caddisflies. The one exception was Babb Creek which continued to be degraded by AMD. Following several years of AMD remediation, Hughey (1995) reexamined Pine Creek and Babb Creek near Blackwell and found improved biota (benthic macroinvertebrates) in Babb Creek but still slight impairment in Pine Creek downstream of Babb Creek. Friday and Hughey (1999) later found AMD reclamation projects in the Babb Creek drainage having a positive influence on downstream benthic communities and for the first time found Pine Creek below Babb Creek to be "nonimpaired" and recovered sufficiently to warrant removing this reach from the 303(d) list of impaired streams in Pennsylvania. The recovery of Babb Creek from AMD remediation, a significant tributary to Pine Creek, remains perhaps the most single successful habitat restoration project in the Pine Creek Watershed. Additional information concerning Babb Creek AMD treatment and fishery responses can be found in Hollender and Kepler (1999) and Detar and Hollender (2005). Updated macroinvertebrate and water quality data was reported by Dressler (2010) who documented continued improvements in Babb Creek, including 17.3 miles of stream reaches in the Babb Creek watershed that were previously impaired are now attaining their designated aquatic life use and can be removed from DEP's List of Impaired Waters.

Pine Creek, Section 01 (Headwaters to Buckseller Run), was examined by Hollender and Kristine (1994) as part of a routine reinventory of the wild trout resources in Fisheries Management Area 3. The 1994 reinventory documented a Class A mixed wild brook and brown trout population and recommendations were made and approved to continue Class A wild trout management with no stocking of hatchery fish from any source.

Section 03 (Genessee Forks downstream to West Branch Pine Creek), was examined by Wilson and Hollender (2001) as part of a routine reinventory of stocked trout resources in Fisheries Management Area 3. The 2001 reinventory found a low density wild trout population and recommended continuation of the PFBC hatchery trout program for this reach of Pine Creek.

Hollender and Wilson (2003) examined the reach of Pine Creek from Waterville downstream to the mouth (Section 13) as part of a statewide effort to characterize warmwater stream sections across the state and results of their survey are incorporated into the following sections. The 2003 survey documented a

diverse warmwater fishery with good catches of smallmouth bass and rock bass as the main gamefish.

A list of PFBC fish sample sites on the mainstem of Pine Creek from 1978-present can be found in Table 3.

Pine Creek Fish Species Distribution, Abundance, and Fishery Resources

Fish have adapted to specific thermal regimes necessary to complete their life cycles and water temperatures are a key factor influencing the occurrence and abundance of fish (Lyons et al. 2009, Wehrly et al. 2003, Lyons et al. 1996). Thermal regimes and associated fish communities in stream reaches have been traditionally described in terms of coldwater, warmwater, and various categories in between and the concepts of these categories and grouping of like waters and their affiliated fisheries are fundamental to stream fisheries management and protecting water quality in temperate regions of the world, including Pennsylvania (Pennsylvania Code Chapter 93 2010, Lyons et al. 2009, Walsh et al. 2007, Hoopes 1989). For example, coldwater streams are dominated by a small number of species in the families of *Salmonidae* and *Cottidae* while warmwater streams and those that transition in between contain a greater richness of species in the families of *Cyprinidae*, *Centrarchidae*, *Percidae*, and *Catostomidae*. A total of 34 fish species have been collected in the mainstem of Pine Creek during PFBC surveys from 1978 to 2009 (Table 4). The distribution and abundance of fish species along the longitudinal continuum from headwaters to mouth of Pine Creek allows for description of various reaches based on these general "thermal" resource categories as follows:

Coldwater

Pine Creek is characterized as a coldwater stream from its source downstream to confluence with Genesee Forks (Sections 01-02; Figure 4). A total of eight fish species occur in this reach including brook trout, brown trout *Salmo trutta*, slimy sculpin *Cottus cognatus*, blacknose dace *Rhinichthys atratulus* and other species commonly found in coldwater streams. Brook trout CPUE was 111.2 fish/km in Section 01 (1994 data) and declined to 13.8 fish per km in Section 02 (1978 data) while brown trout CPUE was 108.7 fish/km in Section 01 (1994 data) and increased to 264.2 fish/km in Section 02 (1978 data) (Table 5, Figure 3). Biomass standards have been established by the PFBC for classifying wild trout streams ranging from Class A (highest biomass threshold and represent the highest quality of the

Commonwealth's naturally reproducing trout populations) to Class E (no wild trout present; PFBC 2009). Pine Creek, Sections 01 and 02, met the criteria for Class A wild trout management based on the past fishery surveys conducted there and continue to be managed in the Class A Wild Trout Waters Program solely for the perpetuation of the wild trout population and receive no stocking of hatchery trout from any source. Statewide angling regulations apply to Sections 01-02.

Transitional

Pine Creek is characterized as a transitional stream from Genesee Forks downstream to Little Pine Creek (Sections 03-12; Figure 4). Like other flowing waters, as Pine Creek becomes wider, water temperatures increase due to increased surface area and increased thermal or solar absorption. However, Pine Creek receives numerous coldwater inputs from tributary streams such as Ninemile Run, Elk Run, Mill Run, Fourmile Run, Campbells Run, Cedar Run, Gamble Run, Slate Run, Naval Run, Miller Run, Truman Run, Callahan Run, Trout Run, Upper Pine Bottom Run, and many additional small, cold, headwater streams. While these streams help to moderate water temperatures during the summer months, the flow in the mainstem of Pine Creek is too great to be significantly influenced by the smaller coldwater tributary streams. Thus, the nature of Pine Creek becomes intermediate or "transitional" between coldwater "trout" streams and more diverse warmwater "bass" streams fairly high in the watershed and maintains this status throughout much of its length. Because the changes in thermal gradients along a larger lotic system with coldwater inputs are subtle, this reach of Pine Creek could be further divided using subcategories such as "cold" or "warm" transitional as proposed by Lyons et al. (2009) or Coolwater 1 or 2 as proposed by Walsh et al. (2007). While these are potential options, Pine Creek would nonetheless still be characterized as some level of transitional stream, which is not good for either trout or smallmouth bass.

On average, sixteen fish species are present per section in fisheries management Sections 03-12 (Table 4). As opposed to Sections 01 and 02, PFBC surveys have shown that brook and brown trout occurrence and CPUE decreases rapidly downstream of Genesee Forks due to high summer water temperatures and by Section 05 (confluence with Elk Run near Gaines), brown trout are the only naturally reproducing salmonid which can be found in the main stem of Pine Creek, and are present in very low numbers (Tables 4 and 5, Figure 3). Brown trout have higher maximum thermal limits than brook trout, but even so, can only persist in lower portions of Pine Creek by seeking thermal

refugia during critical periods and likely cannot survive year round in the majority of this reach. Wild trout biomass classifications for Sections 03-12 are Class D, indicating a low biomass of wild trout present and a significant decline from the Class A wild trout populations located in Sections 01-02.

Other species from the families of *Cyprinidae*, *Centrarchidae*, *Percidae*, and *Catostomidae* which can withstand higher summer water temperatures can be found in greater abundance and distribution in Pine Creek between Genesee Forks and Little Pine Creek (Sections 03-12; Table 4). Warm/coolwater sportfish such as smallmouth bass and rock bass *Ambloplites rupestris* persist in various abundance with CPUE ranging from 4.8-49.5 fish/km and 2.4-25.5 fish/km respectively and provide marginal to good angling opportunities (Table 5, Figure 3). With low to marginal populations of trout and bass, additional angling opportunities are provided in these reaches through the PFBC hatchery trout program.

Approximately 44,400 adult hatchery trout (2010 allocation) are stocked by the PFBC in Pine Creek Sections 03-12 (with the exception of Section 09) from Genesee Forks downstream to the confluence with Little Pine Creek in Waterville (Table 6, Figure 5). Thus, stocked trout are allocated to about 57 miles of Pine Creek, and due to its large width and length, it receives the most PFBC hatchery trout of any stream in the state. Section 09 (Campbells Run downstream to Blackwell) is not stocked with trout because of limited access in the lower Pine Creek Canyon. Sections 03-05, 07-10, and 12 are managed under statewide angling regulations. Sections 06 (Darling Run downstream to 150 m downstream of Owassie Slide Run) and Section 11 (Slate Run downstream to 150 m upstream of Naval Run) are managed under Delayed Harvest Artificial Lures Only (DHALO) regulations. Sections 06 and 11 are both about 1.6 km (1 mile) in length and provide for improved angling opportunities and diversity as they are open to year-round angling and receive stockings in the early spring, spring, and fall periods to encourage use prior to opening day, during regular trout season, and in autumn (Figure 6).

Warmwater

Pine Creek is characterized as a warmwater stream from Little Pine Creek downstream to the mouth (Section 13; Figure 4). Fish species diversity is at its highest in this section with a total of 27 fish species documented (Table 4). This is the only section of Pine Creek where redbreast sunfish *Lepomis auritus*, bullhead *Ameirus spp.*, and other fish species commonly associated with warmwater streams and rivers are found.

Smallmouth bass and rock bass CPUE are near their highest levels at sites within this section (Table 5, Figure 3). Additional angling opportunities are provided by occasional walleye and panfish. This section is managed for natural reproduction of warmwater species under statewide regulations with no stocking.

Additional Fishery Resources in the Pine Creek Watershed

Besides the mainstem of Pine Creek, many other fishery resources are available in the watershed. Over 255 km (159 miles) of tributary streams currently meet the criteria for Class A wild trout management with many more miles of naturally reproducing trout water and over 35 km (22 miles) of these streams are included in the PFBC Wilderness Trout Stream program (Tables 7 and 8; Figures 7-9). All of these wild trout stream reaches are managed under statewide angling regulations. In addition, 40 km (25 miles) of streams are managed under various special regulations including Catch and Release Fly Fishing Only, Trophy Trout Artificial Lures Only, Wild Brook Trout Enhancement, and Delayed Harvest Artificial Lures Only regulations (Table 9, Figure 6). In addition to Pine Creek, there are 14 tributary stream sections totaling 68 km (42 miles) and three impoundments totaling 69.9 ha (172 acres) that are stocked with trout totaling approximately 52,000 PFBC hatchery trout annually (2010 allocation, Table 6). Stocked trout fishing opportunities are also provided in the watershed through stockings conducted by PFBC sponsored Cooperative Nurseries including Morris Rod & Gun Club, Potter County Anglers Club, Arnot Sportsmen Club, and Hillside Rod & Gun Club.

Water Temperature Evaluation

In an attempt to further describe environmental conditions in Pine Creek, we compiled water temperature data available from four DEP Water Quality Network (WQN) sites on Pine Creek located at Galeton, Darling Run, Cedar Run, and Ramsey (Table 10). These surface water temperatures were recorded periodically from 1944 to 2009. As expected, results of the water temperature data closely complemented the biological data and indicated that summer water temperatures exceeded the thermal maximum limit for brook and brown trout of 22°C (72°F) and 26°C (78°F), respectively (Piper et al. 1982). Smallmouth bass start feeding at 10°C (50°F) with optimal temperatures for growth around 26-28°C (79-83°F) (Carlander 1977, Scott and Crossman 1973,

Hollender 1978). Most of the mainstem of Pine Creek has temperatures recorded which are below ideal thermal regimes necessary for good growth rates of smallmouth bass.

During August 2009, we deployed Hobo® temperature monitors in Little Pine Creek near the town of English Center and just upstream of Otter Run. Peak daily temperatures routinely exceeded thermal maximum limits for brook trout and regularly exceeded stressful levels for brown trout (Figures 10 and 11). Brown trout thermal limits were approached on six occasions. Little Pine Creek is a major tributary to the lower reaches of Pine Creek and these data further show temperature limitations for trout in the watershed.

From May 18 - October 4, 2010 DEP staff deployed a water quality monitoring sonde that measured multiple parameters including water temperature in Pine Creek at Hamilton Bottom Access Area near Jersey Mills (DEP 2010). From June 20 - September 4, 2010 peak daily water temperatures exceeded 25°C (77°F) most days (66 of 77 days) and even exceeded 30°C (86°F) on 11 days (Figure 12). Furthermore, water temperatures did not drop below 25°C (77°F) on 23 days (Figure 12). This thermal regime far exceeds that of which could support a year-round coldwater fishery including thermal maximum limits for brook, brown and rainbow trout and often there was minimal or no recovery of water temperatures at night. However, summer 2010 flows in Pine Creek were below the long-term (1918-2009) mean for much of the evaluation period. Thus, it is likely that thermal issues were exacerbated during summer 2010. Nonetheless, peak water temperatures still exceeded 25°C (77°F) on 7 of 10 days in summer 2010 where discharge exceeded the long-term average. Thus, even during summers with "normal" flows, water temperature will continue to be the major limiting factor in Pine Creek.

Trout Thermal Refuge Issues

Pine Creek and its tributaries contain exceptional fishery resources and provide for high quality and diverse recreational angling and boating opportunities. However, as discussed previously in this plan, Pine Creek from Genesee Forks downstream to the mouth (Sections 03-13) and several of its larger tributaries typically become too warm during the summer months to support wild trout. Thus, trout are stocked by the PFBC during the spring and fall to provide for high quality, seasonal trout angling opportunities while water temperatures are cooler and favorable for near-term survival. The vast

majority of trout are stocked by the PFBC during spring, with a limited program in the fall. As water temperatures warm during the late spring or early summer, hatchery trout that survive and are not harvested by anglers eventually seek coolwater refuge areas for survival. Often, the coolwater refuge areas are located at the mouths of smaller tributary streams. Fishery surveys conducted in Pine Creek suggest that the stream supports a low density wild trout population in the areas where trout congregation has occurred. Therefore, it is likely that the majority of trout that have congregated at the mouths of tributary streams such as Trout Run, Slate Run, Mill Creek, and others were stocked trout. Stocked trout typically have considerably lower fitness levels than wild trout. They are selected to perform well in culture facilities and to provide for seasonal angling opportunities in streams that cannot support robust wild trout populations.

As water temperatures rise in Pine Creek, the metabolic rate of trout also rises, resulting in more feeding and greater activity (Detar et al. 2006). Temperatures rising into the stress level for trout will lead to weight loss regardless of how much they eat. As water temperatures continue to rise beyond a certain point, feeding activity will decline and eventually cease. Thus, even those individuals that survive in Pine Creek through the summer months are typically in very poor condition entering the fall and winter. Overwinter mortality is typically among the leading cause of natural mortality within trout populations, especially for individuals in poor condition (Carline and Machung 2001). Therefore, few trout stocked in Pine Creek are expected to survive from one year to the next. If trout were surviving in any significant numbers, we would no longer need to stock the large numbers of hatchery trout each year.

Allowing anglers to legally harvest stocked trout, rather than allowing the fish to die of natural causes, is consistent with the goals of PFBC fisheries management on stocked trout waters statewide and is a better, more cost effective use of these fish (PFBC 2009). Closing portions of Pine Creek when trout are crowded at tributary mouths will ultimately limit fishing opportunities for both stocked trout and the naturally occurring warmwater fish species while having no discernable trout population benefits. Additionally, large numbers of stocked trout persisting into warm summer months may be an indication of excessive stocking rates and/or low angler use and adjustments may be necessary to ensure a better use of this resource.

Closing portions of Pine Creek would also create major law enforcement problems. Limits would need to be defined for

closed areas and criteria would need to be established to determine which areas would be closed. It would be difficult and impractical to define all of the potential refuges and establish temporary, enforceable regulations, let alone adequately post them so that anglers would know they cannot fish in these areas. Additionally, a change in weather, such as a cold front and precipitation event, could improve conditions. Thus, the PFBC would need to be able to determine when angling could continue in a timely manner. Additional details concerning trout thermal issues and closure of coldwater tributary mouths to angling during summer months can be found in Appendix A.

2008 Pine Creek Angler Use, Harvest, and Opinion Survey

To gain contemporary insight into the varied fisheries in Pine Creek, an angler survey was conducted from April 5 - October 30, 2008 by the Department of Conservation and Natural Resources (DCNR) and Penn State University's Department of Recreation, Park, and Tourism Management (PSU). The angler survey was part of a larger outdoor recreational use survey conducted in the Pine Creek valley by Graefe et al. (2010). The angler survey was designed to estimate angler use, catch, and harvest and to assess angler opinions and preferences for Pine Creek Sections 11, 12, and 13. DCNR provided support for the angler survey in the form of three creel clerks and funding for PSU analysis and reporting. PFBC staff provided technical guidance and support for creel survey design. However, because PSU did not complete analysis of the angler survey data, PFBC staff was asked to complete the analyses including expanded effort, catch, and harvest estimation. Thus, two reports are attached to this management plan as appendices: Appendix B - Angler Use, Catch, Harvest, Opinion and Preference Survey on Pine Creek (309A), Sections 11-13, April-October 2008 prepared by PFBC staff that focuses on use, catch, and harvest; and Appendix C - Pine Creek Angler Survey 2008-2009 prepared by PSU that focuses on angler opinions and preferences. A brief summary of the results follows.

Section 11 - Delayed Harvest Artificial Lures Only (DHALO) Limits: Slate Run downstream to 150 m upstream of Naval Run (1.9 km, 1.2 mi)

There were an estimated total of 8,400 hours expended in 2,817 trips to Pine Creek, Section 11 during the course of the survey from April 5 to October 30, 2008 (Tables 2 and 3). Anglers

caught an estimated 1,626 brown trout, 5,452 rainbow trout, 215 smallmouth bass, 64 walleye, and 58 other (chubs, fallfish, rock bass, carp, and catfish) species combined (Tables 4, 5, 6, 7, and 8). An estimated total of 234 brown trout, 374 rainbow trout, and 57 smallmouth bass were harvested by anglers fishing in Section 11 (Tables 9, 10, and 11). Thus, harvest rates were estimated to be 14% for brown trout, 7% for rainbow trout, and 27% for smallmouth bass. When trout species are combined, harvest rate was estimated to be 9%.

Peak angler use occurred in Section 11 during May with 3,514 hours expended or about 42% of the total effort during the survey period. Additionally, 1,095 trips occurred in May or about 39% of the total trips during the survey period. Correspondingly, angler catch was highest in May, with 2,707 trout (brown and rainbow combined) caught, or about 38% of the total catch for the survey period. Angler use and catch decreased substantially from July-October, with only 432 trips (15%) occurring during the summer and fall. Zero trout were reported caught during the July-October period.

Angler use in Section 11, DHALO, (712 hr/ha) seems relatively low when compared to other waters managed with PFBC hatchery trout (DHALO: 1,868 hr/ha (Greene and Weber 1995). However, one must keep in mind the larger mean width of these Pine Creek sections in comparison to other waters which have been evaluated.

There were 1.1 angler trips/stocked trout in Section 11 during the survey period. Section 11 met stocked trout program objectives of 1 trip/stocked trout.

Angler catch rates of 0.84 trout/hr in Section 11 were good and similar to angler catch rates for other DHALO waters surveyed (1.03 trout/hr; Greene and Weber 1995).

Section 12 - Approved Trout Water, Statewide Regulations
Limits: 150 m upstream of Naval Run to the
confluence with Little Pine Creek (24.3 km, 15.1
mi)

There were an estimated total of 30,759 hours expended in 9,854 trips to Pine Creek, Section 12, during the course of the survey from April 5 to October 30, 2008 (Tables 2 and 3). Anglers caught an estimated 2,252 brown trout, 21,515 rainbow trout, 2,954 smallmouth bass, 558 walleye, and 2,502 other species

(chubs, fallfish, rock bass, carp, and catfish) combined (Tables 4, 5, 6, 7, and 8). An estimated total of 626 brown trout, 5,936 rainbow trout, 0 smallmouth bass, and 478 walleye were harvested by anglers fishing in Section 11 (Tables 9, 10, 11, and 12). Thus, harvest rates were estimated to be 28% for brown trout, 28% for rainbow trout, 0% for smallmouth bass, and 86% for walleye. When trout species are combined, harvest rate was estimated to be 28%.

Angler use in Section 12, approved trout water and statewide regulations, (183 hr/ha) was relatively low when compared to other waters managed with PFBC hatchery trout (statewide regulations on 1L river sections: 309 hr/ha (Greene and Weber 1993)), but one must keep in mind the larger mean width of these Pine Creek sections in comparison to other waters which have been evaluated.

Peak angler use occurred in Section 12 during April with 17,633 hours expended or about 57% of the total effort during the survey period. Additionally, 5,318 trips occurred in April or about 54% of the total trips during the survey period. Correspondingly, angler catch was highest in April, with 18,437 trout (brown and rainbow combined) caught, or about 78% of the total catch for the survey period. Angler use and catch decreased substantially from July-October, with only 780 trips (8%) occurring during the summer and fall. Zero trout were reported caught during the July-October period.

There were 0.6 angler trips/stocked trout in Section 12 during the survey period. Section 12 did not meet stocked trout program objectives of 1 trip/stocked trout.

Angler catch rates were good in Section 12 (0.77 trout/hr) and were greater than the average of 0.39 trout/hr and 0.24 trout/hr reported by Greene and Weber (1993) for other similar waters where angler catch was evaluated following the inseason and preseason plants, respectively.

***Section 13 - Statewide Regulations, No stocking of any species,
Warm/Coolwater fishery
Limits: Confluence with Little Pine Creek
downstream to the mouth (22.4 km, 13.9 mi)***

Section 13 of Pine Creek represents the only warmwater stream or small river not stocked with hatchery trout in Pennsylvania

where angler use information has ever been collected by the PFBC. Thus, there is little information for comparison of angler use or catch. While much larger in size, angler use and harvest data was also collected on the West Branch Susquehanna River, Sec 06, during 2008. Catch rate (1.2 fish/hr) of smallmouth bass in Pine Creek, Section 13, exceeded those estimated on the West Branch Susquehanna River, Sec 06, in 2008 of 0.75 fish/hr, while harvest rates were similar (4% on Pine Creek, 0% on West Branch Susquehanna River). The inclusion of Section 13 provided an excellent opportunity to capture a glimpse into angler use on an unknown resource of the Commonwealth which may be underutilized. Creel survey statistics should be provided to PFBC Warmwater Unit for incorporation into the Angler Use and Harvest Compendium (Lorantas 2010).

Angler use of 13.8 hours/ha for section 13 is well below use generated for upstream Pine Creek sections which are well promoted and stocked with hatchery trout (Table 14). However, significant angling opportunities exist for warmwater species managed entirely by natural reproduction considering overall angler catch rates of 385 fish/ha, 2.3 fish/hour, and 1.2 bass/hr when compared to overall survey catch rates from larger warm/coolwater systems (River category) of 73.6 fish/ha, 1.5 fish/hour, and 0.9 bass/hour (Lorantas 2010).

Angler specialization, opinions, and preferences Sections 11-13

The following angler preference and opinion results are combined for all three Pine Creek Sections (11-13). Most (99%) of the anglers interviewed were wading or fishing from shore. A substantial portion of anglers used flies (37%) followed by bait (26%) and lures (24%) as a terminal tackle type. Most (73%) of those anglers using bait preferred worms, larva, and salmon eggs. As expected based on the results of total catch for sections 11-13, most (92%) of the anglers interviewed were targeting trout. Responses varied when anglers were asked why they chose a particular spot to fish but the most common answer (26%) was tradition.

When asked about their trip, most anglers (75%) indicated their trip length was less than 3 days, most (86%) were alone or with one or two other anglers, nearly 60% had fished Pine Creek ten

times or fewer in the last 12 months, and the majority (74%) fished more than 10 times in Pennsylvania in the last 12 months.

A slight majority (52%) of anglers fishing in Sections 11-13 in 2008 indicated they pay close attention to water temperature when fishing for trout. Most of the anglers interviewed (67%) were either neutral or disagreed with the statement "Trout that move into cold water near tributary mouths or spring seeps in summer months should be harvested because most will die anyway" but, most (62%) were either neutral or disagreed with the statement "The cold water near tributary mouths or spring seeps where trout gather in summer should be off-limits to fishing".

Besides hatchery trout, other species currently managed solely on natural reproduction (i.e., walleye, smallmouth bass), are providing for angling in Sections 11-13 beyond the few months of stocked trout season.

Results of In-Depth Follow-up Survey - summarized from Graefe et al. (2010)

Angler Profile

Most of the participants in the follow-up survey were male (97%), not year-round or seasonal residents of the Pine Creek Valley (65%), from Pennsylvania (86%), and had stayed overnight on their most recent trip to Pine Creek (68%). A slight majority of the anglers surveyed (58%) indicated they fish during the warm periods of the summer months, some (36%) indicated they fish Pine Creek at night, about two thirds (67%) fish only the main stem of Pine Creek and not tributaries, and almost one quarter of the participants (23%) almost always fish in the Delayed Harvest Artificial Lures Only waters.

Angler Motivations

Survey participants ranked importance of possible reasons on a 5 point scale. Anglers motivations for fishing related to being outdoors and experiencing natural surroundings (mean = 4.4/5.0), relaxation (4.3), and escape from the regular routine (4.2) were the most important reasons for fishing. Anglers attached more importance to the challenge and sport of fishing (mean = 4.0) than to physical exercise, developing skills, or testing equipment (mean = 3.0, 3.0, and 1.9, respectively). Most participants placed greater importance on the experience of the catch rather than seeking a trophy fish or obtaining fish for eating (mean = 4.0 versus 2.1 and 1.9, respectively).

Angler Satisfaction

Most of the anglers participating in the follow-up survey (93%) thoroughly enjoyed their fishing trip and many (83%) thought their trip was well worth the money they spent on it. While most (62%) anglers were neutral or satisfied with the numbers of fish caught on their fishing trip over three quarters (77%) were satisfied with catching the types of fish they hoped to. Relatively few of the anglers were bothered by either the behavior (17%) or number (22%) of other people on Pine Creek.

Anglers' Consumptive Attitudes

Almost 80% of the anglers thought a fishing trip can be enjoyable even if no fish are caught with 22% thinking that that more fish I caught, the happier I am. Almost half of the anglers (46%) agreed with the statement "I would rather catch one or two big fish than five smaller fish" but less (34%) agreed with the statement "The bigger the fish I catch, the better the fishing trip". Anglers were just as happy to release the fish they caught (90%) and only 7% agreed with the statement "I must keep the fish I catch for the trip to be successful".

Angler Expenditures

The average Pine Creek angler reported spending a total of \$216.84 on their most recent fishing trip (average of 7 days) which converted to \$56.82 per day (or trip, as defined in PFBC analyses) of fishing on Pine Creek. Highest expenses were for lodging, food and drink, and gasoline. As there were an estimated 13,540 angler trips during the course of the creel portion of the survey from April 5 through October 30, 2008 this extrapolates to a potential \$769,343 ($\$56.82/\text{trip} \times 13,540$ trips) spent by anglers fishing on Pine Creek.

Summary

Pine Creek and its watershed provide a diversity of angling opportunities in a unique and beautiful natural setting. The value of this resource is confirmed by the five major resource plans that have been developed over the years, special designations, and passion for protecting, conserving, and enhancing its treasures by the people who live, work, and recreate in this area.

While the vast forested and largely undeveloped watershed could lead one to believe that water temperatures in Pine Creek remain cold year-round and that it supports a coldwater fishery from

source to mouth, this is unfortunately not the case and hasn't been since the region was heavily logged in the late 1800's and early 1900's. Results of the earliest biological surveys and temperature monitoring from the 1930s to the present provide sound data that show Pine Creek only supports a robust coldwater fishery from in its headwater reaches (headwaters downstream to Genessee Forks; Sections 01-02). From Genessee Forks downstream to Little Pine Creek in Waterville (Sections 03-12), Pine Creek can be characterized as a transitional stream that becomes too warm during the summer months to support trout, but is cooler than the ideal thermal regime necessary to achieve good smallmouth bass growth rates. Therefore, because these transitional reaches are not ideal for either trout or smallmouth bass, the PFBC stocks trout in the spring and fall to provide for quality, seasonal angling opportunities. The lower reach of Pine Creek from Little Pine Creek to the mouth can be described as a warmwater fishery and is managed for warmwater fish species through natural reproduction.

Pine Creek's Chapter 93 water quality designation is HQ or EV throughout its entire length providing for increased protection.

In addition to the mainstem of Pine Creek, many other fishery resources are present in the watershed. Nearly 257 km (160 miles) of tributary streams currently meet the criteria for Class A Wild Trout Waters with many more miles of naturally reproducing trout water and over 35 km (22 miles) of these streams are included in the PFBC Wilderness Trout Stream program. In addition, 40 km (25 miles) of streams are managed under various special regulations and there are 14 tributary stream sections totaling 68 km (42 miles) and three impoundments totaling 69.9 ha (172 acres) that are stocked with trout annually.

Future Direction

The PFBC's current management approach for Pine Creek is to manage the reaches that support good wild trout populations for wild trout with no stocking. In the reaches that become too warm during the summer months to support good wild trout populations, hatchery trout are stocked to provide for quality seasonal angling opportunities. In the lower most reaches of Pine Creek that support the most robust warmwater fish populations, we are managing for these species. Because water temperature is the main limiting factor in Pine Creek, our options are fairly limited. Fingerling trout stocking has been

discussed for Pine Creek but natural reproduction is not the limiting factor. If year-round coldwater was present and low numbers of trout were being collected during fishery evaluations, then fingerling trout stocking may be an appropriate management option. However, because water temperature during the summer months is the main limiting factor, fingerling trout would be subjected to the same conditions in Pine Creek as other trout and survival is expected to be very low. Stocking fingerling trout into Pine Creek is not recommended and would be an inefficient use of the product and the PFBC's financial resources. We feel that it's critically important to recognize the limiting factors in any stream and manage accordingly.

Looking beyond the mainstem of Pine Creek is where we may have the greatest opportunity to improve management and protection. There are many unassessed streams in the Pine Creek watershed that likely harbor wild trout populations. Many of these streams are located on State Forest Land and were, until recently, considered "safe" from development and mineral extraction. However, with the recent Marcellus Shale boon, much of the Pine Creek watershed has been leased for natural gas drilling. If wild trout are documented in a stream via a fishery survey, the stream can be recommended for addition to the PFBC's Natural Reproduction List. Once a stream is approved for addition to the list it receives a higher level of protection from impacts and the adjacent wetlands become Exceptional Value Wetlands, which is very important to the overall protection of a stream's aquatic resources. Additionally, if a wild trout population is documented in an unassessed stream and it meets the minimum criteria for Class A Wild Trout Waters, then it can be recommended for addition to this program. Class A designation qualifies a stream for a Chapter 93 water quality designation upgrade to High Quality Cold Water Fishes and provides increased protection for the stream.

Through the reinventory process, additional streams may be identified as candidates for the PFBC's Wilderness Trout Streams Program. Wilderness stream designation qualifies a stream for a Chapter 93 water quality designation upgrade to Exceptional Value, providing maximum protection for the stream. During the 2010 field season, 12 streams in the Pine Creek watershed were assessed for wild trout status. Eight out of 10 waters met the criteria for continued listing on the PFBC's Streams that Support Natural Reproduction of Trout list. Two unassessed waters were surveyed that were not already on the list and neither met the criteria for listing.

The Pine Creek watershed's fishery resources would also benefit from instream and riparian habitat enhancement projects. The PFBC's Division of Habitat Management has worked with DCNR, County Conservation Districts, Trout Unlimited, Northcentral Pennsylvania Conservancy, and others to implement a number of projects in the watershed. Some of the more recent projects include Asaph Run, Francis Branch, Long Run, and Trout Run (Cammal). Continuing to build on these partnerships is an excellent way to improve physical habitat, reduce erosion and sedimentation, and improve bank and road stability, especially in streams that have dirt and gravel forest roads alongside them.

Expansion of the Dirt and Gravel Roads Program in the Pine Creek Watershed would also significantly benefit wild trout streams. The aggregate used in the dirt and gravel road program significantly reduces sedimentation and its limestone base provides additional buffering capacity. As State Forest Roads and township roads are used for access to Marcellus gas well sites, the guidelines DCNR developed for best management practices of improving road surfaces should be implemented (DCNR 2011), which would greatly reduce erosion and sedimentation. Our observations of several township roads in the Pine Creek watershed during winter 2009/2010 that were being used to access Marcellus well sites was that the roads were not built to handle the heavy truck traffic, and were not improved in any manner prior to well development. The roads were heavily rutted and much erosion was occurring. The impacts of sedimentation can be severe, especially for brook trout, and upgrading the roads may help to reduce impacts of well drilling on the watershed.

Management Recommendations

1. Continue present management strategies for Sections 01 and 02 as Class A Wild Trout Waters under Commonwealth Inland Waters angling regulations.
2. Continue present management of Sections 03-05, 07-08, 10, and 12 as Class D hatchery supported trout waters under Commonwealth Inland Waters angling regulations.
3. Continue present management of Sections 06 and 11 as hatchery supported trout waters under Delayed Harvest Artificial Lures Only (DHALO) special regulations.
4. Continue present management of Section 09 as Class D wild trout water under statewide angling regulations with no stocking due to limited access.

5. Continue present management strategy for Section 13 as a naturally reproducing warmwater fishery under Commonwealth Inland Waters angling regulations.
6. Make further reductions to stocked trout allocation rates for Sections 10-12 beyond 2012 if noticeable congregation of stocked trout at tributary mouths during summer months continues causing problems among angler/conservation groups with differing viewpoints regarding whether these fish should be fished over or not. We feel that some additional reduction in stocking rates may occur without sacrificing quality angling opportunities due to high levels of voluntary catch and release documented in the 2008 Pine Creek Angler Survey and on stocked trout streams on a statewide basis in 2005. In addition, move inseason stockings to late April to maximize angling opportunities prior to water temperatures increasing to stressful levels (completed in 2011).
7. For the 2012 season, complete the "How to properly catch and release fish" sign, which will include a bullet on effects of water temperature for both cold and warmwater species, and post at public access areas.
8. For the 2013 or 2014 season, consider moving Section 12 into a pilot program which would function similarly to the Approved Trout Waters Open to Year-Round Fishing Program, but would allow for harvest of trout on a year-round basis. Section 12 is the lowermost stocked section of Pine Creek and warms more rapidly than other sections. The main advantages of adding Section 12 to the Approved Trout Waters Open to Year-Round Fishing Program would provide anglers the opportunity to fish during March and April prior to the traditional opening day and harvest fish if they chose to do so during this period, which may help to reduce trout congregation during summer months. While Section 12 is the primary candidate for this program, if this idea gains traction, Section 10 is also large and would be a good candidate for the program as well. During springs with lower flows, this period of time can offer excellent angling including good insect hatches. Additionally, this would provide for additional boat-angling opportunities during a period with good flows and Section 10 and 12 are long enough that float trips could be accommodated.
9. If the year-round season recommendation does not move forward for 2013 or 2014, consider changing the preseason stocking dates of Sections 10-12 from early March to mid March if the production system can accommodate this without jeopardizing the stocking of other waters. This has been a request from the WCO as well as sportsmen.

10. For the 2012 season, eliminate the fall stocking of Section 12 due to low angler use documented during the 2008 Pine Creek Angler Survey. Maintain fall stocking of Section 11 (DHALO) due to fair angler use documented during the 2008 Pine Creek Angler Survey. Maintain fall stocking of Section 06 (DHALO) as well. Increase the fall stocking rate to both DHALO areas (Sections 06 and 11) to provide for quality angling opportunities that may serve as destinations for fall anglers (completed in 2011).
11. For the 2012 season, change the fall plant composition in Sections 06 and 11 to 70% rainbow and 30% brown mix in both sections. Historically, the fall plant was comprised of 100% rainbow trout (completed in 2011).
12. Work with partners to assess uninventoried tributaries to Pine Creek to determine wild trout status and update Natural Reproducing Trout Waters List and Class A Wild Trout Waters lists as appropriate (ongoing).
13. Add Trout Run (at village of Cedar Run), Bear Run, and Miller Run to the Wilderness Trout Streams Program as was recommended in the management reports prepared for these three streams when they were inventoried in 1993, but they were never officially approved by the Commission.
14. Continue to periodically reinventory biological, chemical, physical, and social attributes at established sites on mainstem Pine Creek and make changes through an adaptive management process. Of special interest is reinventorying the warmwater fish populations in Section 12 due to the good catch rates of smallmouth bass and walleye documented in the 2008 Pine Creek Angler Survey. It is recommended that all sections of Pine Creek be reinventoried by 2025.
15. Continue to support and implement habitat enhancement and restoration projects on coldwater tributary streams throughout the watershed.
16. Expand the dirt and gravel road program throughout the Pine Creek watershed, especially on roads that closely parallel wild trout streams.
17. Work with DEP to assure that Pine Creek and its tributaries are afforded the highest level of protection possible under Chapter 93.
18. Conduct a public meeting during 2011 to present management plan overview and provide opportunity for public comments (completed in 2011).
19. Work with PFBC fish passage biologist to investigate the feasibility of providing fish passage at Galeton Dam through dam removal or construction of a fishway. Past discussions with Galeton Borough have indicated that they are not interested in removing the dam, despite its negative impacts

to the stream including thermal pollution and fish passage barrier.

References

- Brezina, E. R. and K. K. Sheaffer. 1970. (DER) Aquatic biological investigation of Pine Creek, Potter, Tioga, and Lycoming counties. Department of Environmental Protection files, Williamsport, PA.
- Buller, A. G. 1931. Pine creek survey report. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Carlander, K. D. 1977. Handbook of freshwater fishery biology volume two. The Iowa State University Press, Ames, Iowa.
- Carline, R. F., and J. F. Machung. 2001. Critical thermal maxima of wild and domestic strains of trout. Transactions of the American Fisheries Society 130:1211-1216.
- Cooper, E. L. and C. C. Wagner. 1971. Fishes of Pine Creek, Pennsylvania. The Pennsylvania State University, University Park, PA.
- Detar, J. and B. Hollender. 2005. Reinventory of the Babb Creek watershed. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Detar, J., T. Greene, B. Hollender, and T. Kamerzel. 2006. Position statement regarding the closure of coldwater tributary stream mouths to angling during the summer months. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Dressler, J. 2010. Aquatic biological investigation, Babb Creek watershed, Tioga County. Department of Environmental Protection files, Williamsport, PA.
- Fermata, Inc. 2005. A recreation plan for the state parks and state forests in the Pennsylvania wilds, Appendix 8, Pine creek valley early action recommendations. Austin, Texas.

- Friday, M. and R. Hughey. 1999. Aquatic biological investigation Pine Creek 303(d) list evaluation. Department of Environmental Protection files, Williamsport, PA.
- Graefe, A. R., A. S. Purrington, H. C. Zinn, and M. C. McKinney. 2010. Pine creek angler survey 2008-2009. Penn State University, University Park, PA.
- Greene, R. T., and R. J. Weber. 1995. Delayed harvest angler use and harvest survey 1993. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Greene, R. T., and R. J. Weber. 1993. Angler use and harvest on Pennsylvania catchable trout fisheries (1998-90 & 1991) (Draft Report). Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Hesser, R., J. Reed, C. Billingsley, R. Hoopes and D. Greene. 1970. Pine creek survey report. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Hollender, B., C. Cooper, D. Mayers, D. Spotts, and R. Lorson. 1978. Pine Creek stream examination report sections 03-10. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Hollender, B. and D. Kristine. 1994. Pine Creek section 01 management plan. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Hollender, B., R. Wilberding, R. Marcinko, and S. Benjamin. 1982. Pine Creek creel survey section 09. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Hollender, B. and S. Kepler. 1999. Babb Creek basin management report. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Hollender, B. and T. Wilson. 2003. Pine Creek reinventory, raw data files. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Hoopes, R.L. 1989. Stream examination manual. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.

- Hughey, R. 1995. Aquatic biological investigation of Pine Creek. Department of Environmental Protection files, Williamsport, PA.
- Hughey, R. 1992. Pine Creek 1992 benthos study. Department of Environmental Protection files, Williamsport, PA.
- Hughey, R. 1991. Aquatic biological investigation of Pine Creek. Department of Environmental Protection files, Williamsport, PA.
- Lillie, E. M. and A. D. Bradford. 1954. Pine Creek Investigation. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Lorantas, R. L. 2010. Angler use and harvest compendium. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Lycoming County Planning Commission. 1996. Pine Creek valley management plan. Lycoming County Court House, Williamsport, PA.
- Lyons, J., L. Wang, and T.D. Simonson. 1996. Development and validation of an index of biotic integrity for coldwater streams in Wisconsin. North American Journal of Fisheries Management 16:241-256.
- Lyons, J., T. Zorn, J. Stewart, P. Seelbach, K. Wehrly, and L. Wang. 2009. Defining and characterizing coolwater streams and their fish assemblages in Michigan and Wisconsin, USA. North American Journal of Fisheries Management 29:1130-1151.
- Marcinko, M., R. Lorson, and Kidney. 1978. Pine Creek stream examination report sections 01-02. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Pennsylvania Department of Conservation and Natural Resources. 2010. Landforms of Pennsylvania. <http://www.dcnr.state.pa.us/topogeo/map13/13dvs.aspx>
- Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry. 2011. Guidelines for administering oil and gas activity on state forest lands. Harrisburg, PA.

- Pennsylvania Department of Conservation and Natural Resources, Bureau of Recreation and Conservation. 2005. Pine creek watershed rivers conservation plan. Harrisburg, PA.
- Pennsylvania Department of Environmental Protection, Division of Water Quality Standards (DEP). 2010. Statewide Surface Water Monitoring Program: Pine Creek temperature data. Department of Environmental Protection files, Harrisburg, PA.
- Pennsylvania Department of Environmental Resources, Division of Wetlands Conservation. 1989. Pine Creek scenic rivers study. Harrisburg, PA.
- Pennsylvania Fish and Boat Commission. 2009. Strategic plan for management of trout fisheries in Pennsylvania. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Piper, R. G., I. B. McElwain, L. E. Orme, J. P. McCraren, L. G. Fowler, and J. R. Leonard. 1982. Fish Hatchery Management. U S Fish and Wildlife Service, Washington, D. C.
- Scott, W.B., and E.J. Crossman. 1974. Freshwater fishes of Canada. Fisheries Research Board of Canada, Ottawa, Canada.
- Shoemaker, M. E. 1931. Pine creek survey report. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- Snyder, A. S. 1934. Pine creek survey report. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.
- U.S. Department of the Interior. 1978. Pine creek wild and scenic river study. Washington, D.C.
- Walsh, M. C., J. Deeds, and B. Nightingale. 2007. User's Manual and Data Guide to the Pennsylvania Aquatic Community Classification. Pennsylvania Natural Heritage Program, Western Pennsylvania Conservancy, Pittsburgh, PA.
- Wehrly, K. E., M. J. Wiley, and P. W. Seelbach. 2003. Classifying regional variation in thermal regime based on stream fish community patterns. Transactions of the American Fisheries Society 132:18-38.
- Wilson, T. and B. Hollender. 2001. Pine Creek section 03 management report. Pennsylvania Fish and Boat Commission files. Bellefonte, PA.

Woods, A. J., J .M. Omernik, and D. D. Brown. 1999. Level III and IV ecoregions of Delaware, Maryland, Pennsylvania, Virginia, and West Virginia. U.S. Environmental Protection Agency, Corvallis, Oregon.

Table 1. Pine Creek fisheries management sections, fisheries management program, and DEP Chapter 93 water quality designation (page 1 of 3).

Section	Section Limits	Length km (miles)	Width m (feet)	County	Fisheries Management Program	DEP Chapter 93
01	Source downstream to Buckseller Run	5.6 (3.5)	4.8 (15.7)	Potter	Class A Wild Trout, Statewide Regulations	HQ-CWF, MF
02	Buckseller Run downstream to Genesee Forks	7.9 (4.9)	8.1 (26.6)	Potter	Class A Wild Trout, Statewide Regulations	HQ-CWF, MF
03	Genesee Forks downstream to West Branch Pine Creek	8.2 (5.1)	15.9 (52.2)	Potter	Statewide Regulations, Approved Trout Water, PFBC trout stocking	HQ-CWF, MF
04	West Branch Pine Creek downstream to Elk Run	6.1 (3.8)	22.0 (72.2)	Potter Tioga	Statewide Regulations, Approved Trout Water, PFBC trout stocking	EV, MF
05	Elk Run downstream to Darling Run	18.6 (11.5)	35.3 (115.8)	Tioga	Statewide Regulations, Approved Trout Water, PFBC trout stocking	EV, MF (to Marsh Ck) HQ-CWF, MF (Marsh Ck to Darling Run)
06	Darling Run to 150 m downstream Owassie Slide Run	1.7 (1.1)	38.0 (124.7)	Tioga	Delayed Harvest Artificial Lures Only, Approved Trout Water, PFBC trout stocking	HQ-TSF, MF

Table 1, continued. Pine Creek fisheries management sections, fisheries management program, and DEP Chapter 93 water quality designation (page 2 of 3).

Section	Section Limits	Length km (miles)	Width m (feet)	County	Fisheries Management Program	DEP Chapter 93
07	150 m downstream Owassee Slide Run to 0.5 miles upstream Campbells Run	10.6 (6.6)	42.8 (140.4)	Tioga	Statewide Regulations, Approved Trout Water, PFBC trout stocking	HQ-TSF, MF
08	0.5 miles upstream Campbells Run downstream to 0.5 miles downstream Campbells Run	1.6 (1.0)	37.9 (124.3)	Tioga	Statewide Regulations, Approved Trout Water, PFBC trout stocking	HQ-TSF, MF
09	0.5 miles downstream Campbells Run downstream to SR 414 bridge crossing in Blackwell	11.9 (7.4)	48.7 (159.8)	Tioga	Statewide Regulations, No PFBC stocking due to limited access in canyon	HQ-TSF, MF
10	SR 414 bridge crossing in Blackwell downstream to Slate Run	17.8 (11.1)	53.8 (176.5)	Tioga Lycoming	Statewide Regulations, Approved Trout Water, PFBC trout stocking	HQ-TSF, MF
11	Slate Run downstream to 150 m upstream Naval Run	1.9 (1.2)	61.1 (200.2)	Lycoming	Delayed Harvest Artificial Lures Only, Approved Trout Water, PFBC trout stocking	HQ-TSF, MF

Table 1, continued. Pine Creek fisheries management sections, fisheries management program, and DEP Chapter 93 water quality designation (page 3 of 3).

Section	Section Limits	Length km (miles)	Width m (feet)	County	Fisheries Management Program	DEP Chapter 93
12	150 m upstream Naval Run downstream to Little Pine Creek	24.3 (15.1)	69.2 (227.1)	Lycoming	Statewide Regulations, Approved Trout Water, PFBC trout stocking	HQ-TSF, MF
13	Little Pine Creek downstream to Mouth	22.4 (13.9)	74.4 (244.1)	Lycoming Clinton	Statewide Regulations, No PFBC stocking (warmwater fishery)	HQ-TSF, MF

Table 2. Water quality in Pine Creek by fisheries management section. Data collected from 1978-2003.

Section	Specific Conductivity umhos/cm	pH su	Alkalinity mg/l	Hardness mg/l
01	83-100	6.9-7.1	15-18	22-27
02	75-90	7.1-7.3	12-15	19-27
03	80-88	7.1-7.4	18-20	26-27
04	70	7.3	17	25
05	70-78	7.0-7.3	16-18	23-24
07	81-86	7.2-7.3	20-21	28-30
09	86-92	7.1-7.2	20-28	28-31
10	76	7.0	13	24
11	74	6.9	12	22
12	56-74	6.9-7.0	4-12	9-22
13	70-133	7.0-7.3	12-20	25-37

Table 3. PFBC fish sample site locations on Pine Creek and sample gear for collections.

Section	Site Date	Site Location	Site Rivermile	Gear
01	6/13/1978	414949/774752	84.10	Electrobackpack
01	8/16/1994	414949/774752	84.10	Electrobackpack
01	6/13/1978	414852/774721	82.90	Electrobackpack
01	8/16/1994	414852/774721	82.90	Electrobackpack
02	6/13/1978	414750/774602	81.70	Electrobackpack
02	6/12/1978	414641/774402	78.80	Electrobackpack
03	6/15/1978	414503/774040	75.00	Electrotowboat
03	7/9/2001	414515/774051	74.77	Electrobackpack
04	6/14/1978	414429/773650	69.40	Electrotowboat
05	6/13/1978	414443/773236	66.40	Electrotowboat
05	6/14/1978	414453/772952	62.10	Electrotowboat
05	6/14/1978	414440/772641	58.20	Electrotowboat
07	6/5/1978	414300/772644	55.30	Day Electroboat
07	6/6/1978	413947/772809	50.70	Day Electroboat
09	6/7/1978	413725/772624	47.00	Day Electroboat
09	6/8/1978	413358/772309	41.40	Day Electroboat
10	5/25/1978	413127/772610	36.90	Day Electroboat
10	7/29/2008	413204/772514	38.75	Electrotowboat (DES)
11	5/24/1978	412815/773011	29.80	Day Electroboat
11	7/29/2008	412802/773008	29.94	Electrotowboat (DES)
12	5/25/1978	412511/772921	25.10	Day Electroboat
12	5/23/1978	412239/772620	20.50	Day Electroboat
12	5/23/1978	412000/772300	16.30	Day Electroboat
12	7/18/1985	411847/772247	14.94	Day Electroboat
13	8/1/1978	411637/771909	9.90	Day Electroboat
13	6/26/2003	411618/771939	9.31	Day Electroboat
13	8/1/1978	411135/771733	2.30	Day Electroboat
13	6/24/2003	411115/771739	1.84	Day Electroboat

Table 4. Fish species occurrence by management section in Pine Creek (page 1 of 2).

Common Name	Scientific Name	Tolerance	01	02	03	04	05	06	07	08	09	10	11	12	13	Cooper*	PFBC
brook trout	<i>Salvelinus fontinalis</i>	I	X	X	X	X										X	X
brown trout	<i>Salmo trutta</i>	M	X	X	X	X	X		X		X	X	X	X	X	X	X
mottled sculpin	<i>Cottus bairdi</i>	I				X	X									X	X
slimy sculpin	<i>Cottus cognatus</i>	M	X	X	X											X	X
blacknose dace	<i>Rhinichthys atratulus</i>	T	X	X	X	X	X									X	X
longnose dace	<i>Rhinichthys cataractae</i>	I	X	X	X	X	X		X		X	X	X		X	X	X
white sucker	<i>Catostomus commersoni</i>	T	X	X	X	X	X		X		X	X	X	X	X	X	X
northern hog sucker	<i>Hypentelium nigricans</i>	I			X	X	X		X		X		X	X	X	X	X
creek chub	<i>Semotilus atromaculatus</i>	T	X		X									X		X	X
fallfish	<i>Semotilus corporalis</i>	M			X	X	X		X		X	X	X	X	X	X	X
cutlips minnow	<i>Exoglossum maxilllingua</i>	I		X	X	X	X		X		X	X	X	X	X	X	X
common shiner	<i>Luxilus cornutus</i>	M			X	X	X		X		X	X	X	X	X	X	X
central stoneroller	<i>Campostoma anomalum</i>	M			X						X	X		X	X	X	X
spottail shiner	<i>Notropis hudsonius</i>	M					X		X						X	X	X
spotfin shiner	<i>Notropis spiloptera</i>	M														X	
rosyface shiner	<i>Notropis rubellus</i>	I			X		X		X		X	X	X	X	X	X	X
mimic shiner	<i>Notropis volucellus</i>	I										X	X				X
bluntnose minnow	<i>Pimephales notatus</i>	T					X							X	X	X	X
river chub	<i>Nocomis micropogon</i>	I			X	X	X		X		X	X	X	X	X	X	X
creek chubsucker	<i>Erimyzon oblongus</i>	M														X	
yellow bullhead	<i>Ameiurus natalis</i>	T													X		X
brown bullhead	<i>Ameiurus nebulosus</i>	T													X	X	X
margined madtom	<i>Noturus insignis</i>	M			X	X	X		X		X	X	X	X	X	X	X
rock bass	<i>Ambloplites rupestris</i>	M				X	X		X		X	X	X	X	X	X	X

Table 4, continued. Fish species occurrence by management section in Pine Creek (page 2 of 2).

Common Name	Scientific Name	Tolerance	01	02	03	04	05	06	07	08	09	10	11	12	13	Cooper*	PFBC
redbreast sunfish	<i>Lepomis auritus</i>	M													X	X	X
pumpkinseed	<i>Lepomis gibbosus</i>	M			X									X	X	X	X
bluegill	<i>Lepomis macrochirus</i>	M													X		X
black crappie	<i>Pomoxis nigromaculatus</i>	M													X		X
smallmouth bass	<i>Micropterus dolomieu</i>	M				X	X		X		X	X	X	X	X	X	X
largemouth bass	<i>Micropterus salmoides</i>	M													X		X
walleye	<i>Sander vitreus</i>	M													X		X
greenside darter	<i>Etheostoma blennoides</i>	I													X		X
tessellated darter	<i>Etheostoma olmstedii</i>	M			X		X					X	X	X		X	X
banded darter	<i>Etheostoma zonale</i>	I					X					X	X	X	X	X	X
shield darter	<i>Percina peltata</i>	I				X	X						X	X		X	X
yellow perch	<i>Perca flavescens</i>	M													X		X
chain pickerel	<i>Esox niger</i>	M					X				X			X	X	X	X
american eel	<i>Anguila rostrata</i>	T							X		X				X	X	X
banded killifish	<i>Fundulus diaphanus</i>	T														X	
common carp	<i>Cyprinus carpio</i>	T												X	X	X	X
Total species			7	7	17	15	19	0	13	0	13	15	16	18	27	28	34

*Cooper and Wagner (1971)

Tolerance designation as provided by D. Fischer, PFBC. T = Tolerant, M = Moderately Tolerant, I = Intolerant

Table 5. First pass electrofishing catch/km for wild trout, smallmouth bass, and rock bass by fisheries management section in Pine Creek.

Section	<u>Brook Trout</u>		<u>Brown Trout</u>		<u>Smallmouth Bass</u>		<u>Rock Bass</u>		Electrofishing Gear
	Total	> 175 mm	Total	> 175 mm	Total	> 250mm	Total	> 175mm	
01	111.2	24.9	108.7	66.6	0.0	0.0	0.0	0.0	Backpack
02	13.8	5.0	264.2	135.0	0.0	0.0	0.0	0.0	Backpack
03	5.6	3.5	36.7	16.7	0.0	0.0	0.0	0.0	Backpack, towed boat
04	3.1	1.6	43.8	35.9	0.0	0.0	0.0	0.0	Towed boat
05	0.0	0.0	11.9	6.4	4.8	0.5	25.5	18.6	Towed boat
06									No sites in current section
07	0.0	0.0	7.7	5.8	9.6	5.6	5.8	5.8	Day electroboat
08									No sites in current section
09	0.0	0.0	4.4	3.6	49.5	7.5	6.0	3.6	Day electroboat
10	0.0	0.0	11.2	7.2	26.4	0.8	2.4	2.4	Day electroboat
11	0.0	0.0	7.6	2.7	43.2	3.4	2.7	2.1	Day electroboat
12	0.0	0.0	8.3	5.5	11.3	1.0	4.4	1.1	Day electroboat
13	0.0	0.0	0.0	0.0	51.6	7.6	24.1	12.6	Day electroboat

Table 6. Stream sections and impoundments that receive PFBC adult hatchery trout in the Pine Creek Watershed and allocation for 2010.

Water	Section	County	Class	Pre-Season	In-Season	Total
Asaph Run	01	Tioga	CHR3	1,400	500	1,900
East Branch Stony Fork	02	Tioga	DGR3	500	300	800
Hamilton Lake	-	Tioga	LC240	3,800	5,800	9,600
Little Pine Creek	02	Lycoming	DHR1S	300	300	600
Little Pine Creek	03	Lycoming	DGR1S	1,200	1,200	2,400
Little Pine Creek	04	Lycoming	DHR1S	600	700	1,300
Little Pine Creek	05	Lycoming	DHR1S	1,100	1,000	2,100
Little Pine Creek	06	Lycoming	DHR1S	2,200	2,200	4,400
Little Pine Lake	-	Lycoming	LC340	3,500	5,100	8,600
Long Run	02	Tioga	CHR3	1,200	800	2,000
Lyman Run	03	Potter	DHR3	1,000	1,200	2,200
Lyman Run Reservoir	-	Potter	LC240	3,500	5,600	9,100
Marsh Creek	03	Tioga	DGR1S	1,300	0	1,300
Pine Creek	03	Potter	DGR2	1,900	1,200	3,100
Pine Creek	04	Potter/Tioga	DGR1S	1,200	800	2,000
Pine Creek	05	Tioga	DGR1L	4,000	2,200	6,200
Pine Creek	06	Tioga	DGR1L	700	700	1,400
Pine Creek	07	Tioga	DGR1L	2,300	1,900	4,200
Pine Creek	08	Tioga	DGR1L	500	500	1,000
Pine Creek	10	Lycoming/Tioga	DGR1L	4,600	3,800	8,400
Pine Creek	11	Lycoming	DGR1L	1,200	1,100	2,300
Pine Creek	12	Lycoming	DGR1L	8,700	7,100	15,800
Stony Fork	01	Tioga	DHR3	1,100	400	1,500
Stony Fork	02	Tioga	DHR2	700	0	700
Upper Pine Bottom Run	02	Lycoming	CHR3	500	0	500
West Branch Pine Creek	02	Potter	CGR2	1,700	1,200	2,900
			Total	50,700	45,600	96,300

Table 7. Class A wild trout waters in the Pine Creek watershed (page 1 of 2).

Water	Section	County	Length km (miles)
Apple Tree Hollow	01	TIOGA	4.0 (2.5)
Baker Branch	01	TIOGA	5.6 (3.5)
Baldwin Run	01	TIOGA	7.9 (4.9)
Bear Run	01	LYCOMING	8.5 (5.3)
Bohen Run	01	TIOGA	2.3 (1.4)
Buck Run	01	TIOGA	3.8 (2.4)
Callahan Run	01	LYCOMING	3.3 (2.1)
Canada Run	01	TIOGA	5.5 (3.4)
Cedar Run	01	TIOGA	6.1 (3.8)
Cedar Run	02	TIOGA	12.2 (7.6)
Commissioner Run	01	POTTER	3.4 (2.1)
Cushman Branch	01	TIOGA	6.1 (3.8)
Cushman Branch	02	TIOGA	1.1 (0.7)
Dixie Run	01	TIOGA	6.3 (3.9)
Elk Run	01	TIOGA	3.1 (1.9)
Elk Run	02	TIOGA	8.9 (5.5)
Fahnestock Run	01	TIOGA	7.6 (4.7)
Flicks Run	01	LYCOMING	7.1 (4.4)
Fourmile Run	01	TIOGA	3.2 (2.0)
Francis Branch	01	TIOGA	6.3 (3.9)
Francis Branch	02	TIOGA	2.9 (1.8)
Genesee Forks	01	POTTER	12.9 (8.0)
Johnson Brook	01	POTTER	6.4 (4.0)
Lyman Run	01	POTTER	3.9 (2.4)
Lyman Run	02	POTTER	6.6 (4.1)
Mill Run	01	TIOGA	6.3 (3.9)
Mill Run	01	LYCOMING	6.4 (4.0)
Miller Run	01	LYCOMING	6.4 (4.0)
Nickel Run	01	TIOGA	6.9 (4.3)
Ninemile Run	01	POTTER	5.1 (3.2)
Ninemile Run	02	POTTER	6.3 (3.9)
Phoenix Run	02	POTTER	8.9 (5.5)
Pine Creek	01	POTTER	7.6 (4.7)
Pine Creek	02	POTTER	7.9 (4.9)
Ramsey Run	01	LYCOMING	6.1 (3.8)
Right Asaph Run	01	TIOGA	2.7 (1.7)
Right Straight Run	01	TIOGA	3.4 (2.1)
Rock Run	01	TIOGA	1.9 (1.2)

Table 7, continued. Class A wild trout waters in the Pine Creek watershed (page 2 of 2).

Water	Section	County	Length km (miles)
Slate Run	01	LYCOMING	11.6 (7.2)
Splash Dam Hollow	01	POTTER	4.3 (2.7)
Sunken Branch	03	POTTER	2.9 (1.8)
Trout Run - cedar run	01	LYCOMING	11.4 (7.1)
Truman Run	01	LYCOMING	4.3 (2.7)
Totals	43		255.5 (158.7)

Table 8. Wilderness trout streams in the Pine Creek watershed.

Water	Section	County	Length km (miles)
Mill Run	01	Lycoming	6.1 (3.8)
Johnson Brook	01	Potter	5.6 (3.5)
Cushman Branch	01	Tioga	5.9 (3.7)
Long Run	01	Tioga	7.4 (4.6)
Nickel Run	01	Tioga	6.6 (4.1)
Pine Island Run	01	Tioga	4.0 (2.5)
Totals	6		35.7 (22.2)

Table 9. Special Regulation waters in the Pine Creek watershed.

Water	County	Section	Length		Regulation
			km	(miles)	
Slate Run	Lycoming/Tioga	01	11.4	(7.1)	Catch and Release Fly-Fishing Only
Francis Branch	Tioga	02	2.7	(1.7)	Catch and Release Fly-Fishing Only
Cedar Run	Lycoming/Tioga	02	11.6	(7.2)	Trophy Trout Artificial Lures Only
Little Pine Creek	Lycoming	04	1.8	(1.1)	Delayed Harvest Artificial Lures Only
Pine Creek	Lycoming	11	1.9	(1.2)	Delayed Harvest Artificial Lures Only
Pine Creek	Tioga	06	1.8	(1.1)	Delayed Harvest Artificial Lures Only
Lyman Run	Potter	02	8.5	(5.3)	Wild Brook Trout Enhancement
Little Pine Lake	Lycoming	-	-	-	Early Season Trout-Stocked Waters
Lyman Run Reservoir	Potter	-	-	-	Early Season Trout-Stocked Waters
Total Length:			39.7	(24.7)	

Table 10. Surface water temperatures (F) periodically collected at DEP Water Quality Network sites on mainstem Pine Creek for April-September from 1944-2009.

Site Location	Years		Apr	May	Jun	Jul	Aug	Sep
	Collected							
Galeton	14	Max	59	66	68	81**	81**	70
1973-1987		Mean	47	55	62	68	68	63
		Min	41	45	55	57	52	54
Darling Run	25	Max	61	64	77*	81**	77*	75*
1973-1998		Mean	48	55	65	67	69	62
		Min	34	48	54	45	58	52
Cedar Run ^a	26	Max	64	64	74*	82**	79**	75*
1944-1978		Mean	46	52	63	72*	68	65
		Min	38	41	45	63	51	53
Ramsey	46	Max	68	68	75*	84**	82**	79**
1963-2009		Mean	51	56	65	73*	73*	68
		Min	40	46	55	68	63	60

* Temperature exceeds lethal limit for brook trout.

** Temperature exceeds lethal limit for brook and brown trout.

^aData obtained from Hollender et al. 1978; no data currently available from EPA STORET for USGS gage on Pine Creek at Cedar Run.

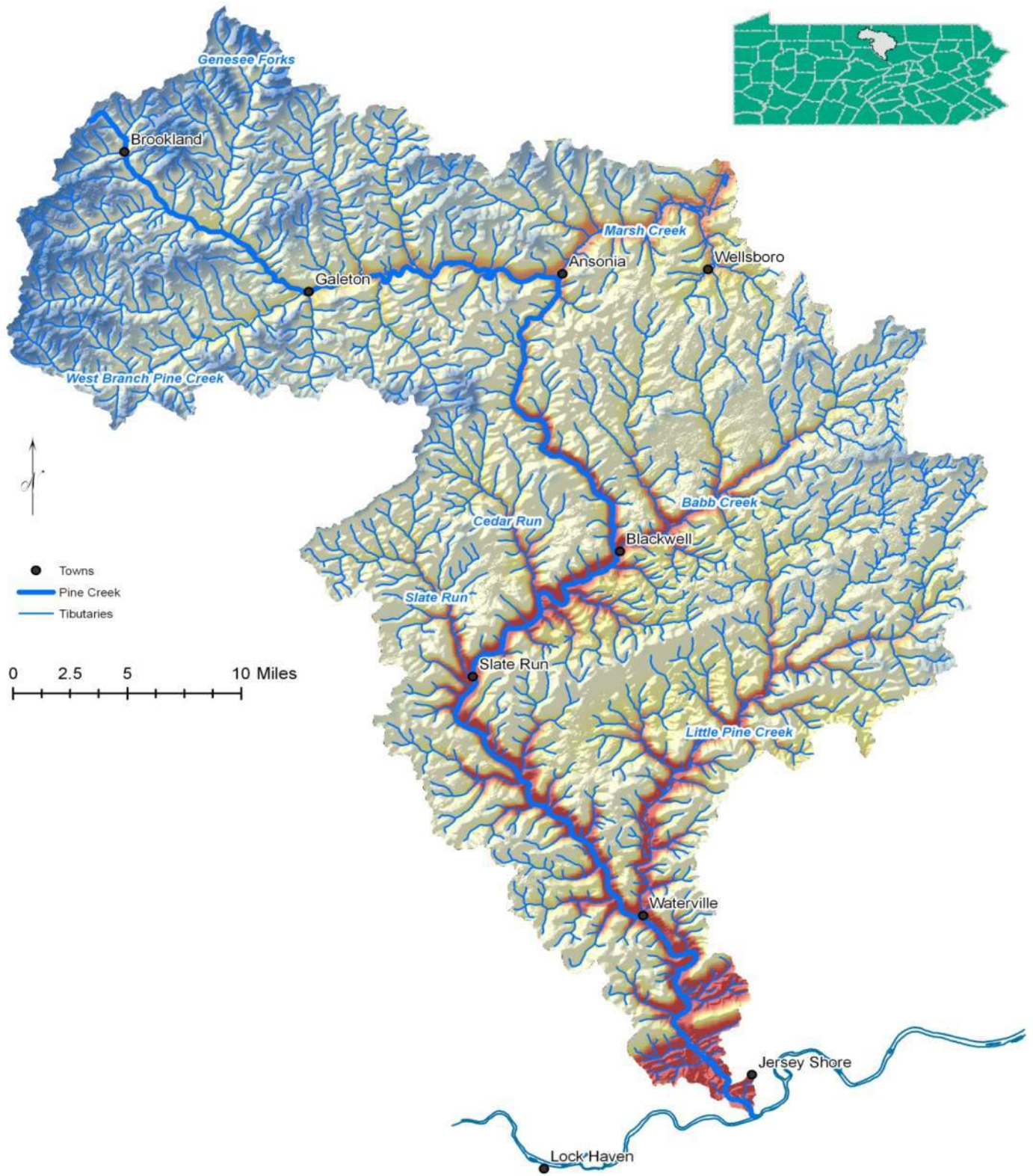


Figure 1. Map of the Pine Creek watershed located in Potter, Tioga, Lycoming, and Clinton counties, Pennsylvania.

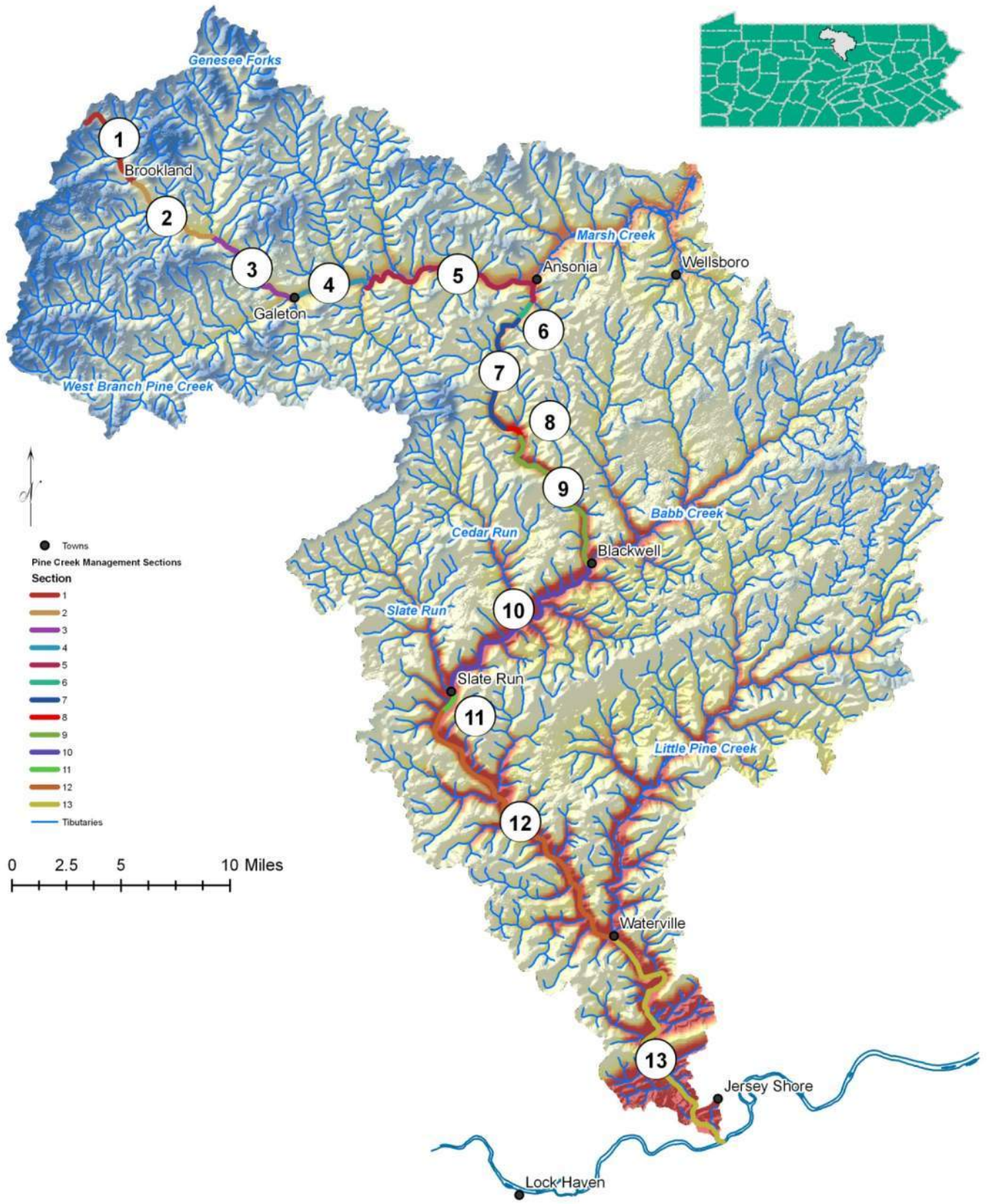


Figure 2. Pine Creek Fisheries Management Sections.

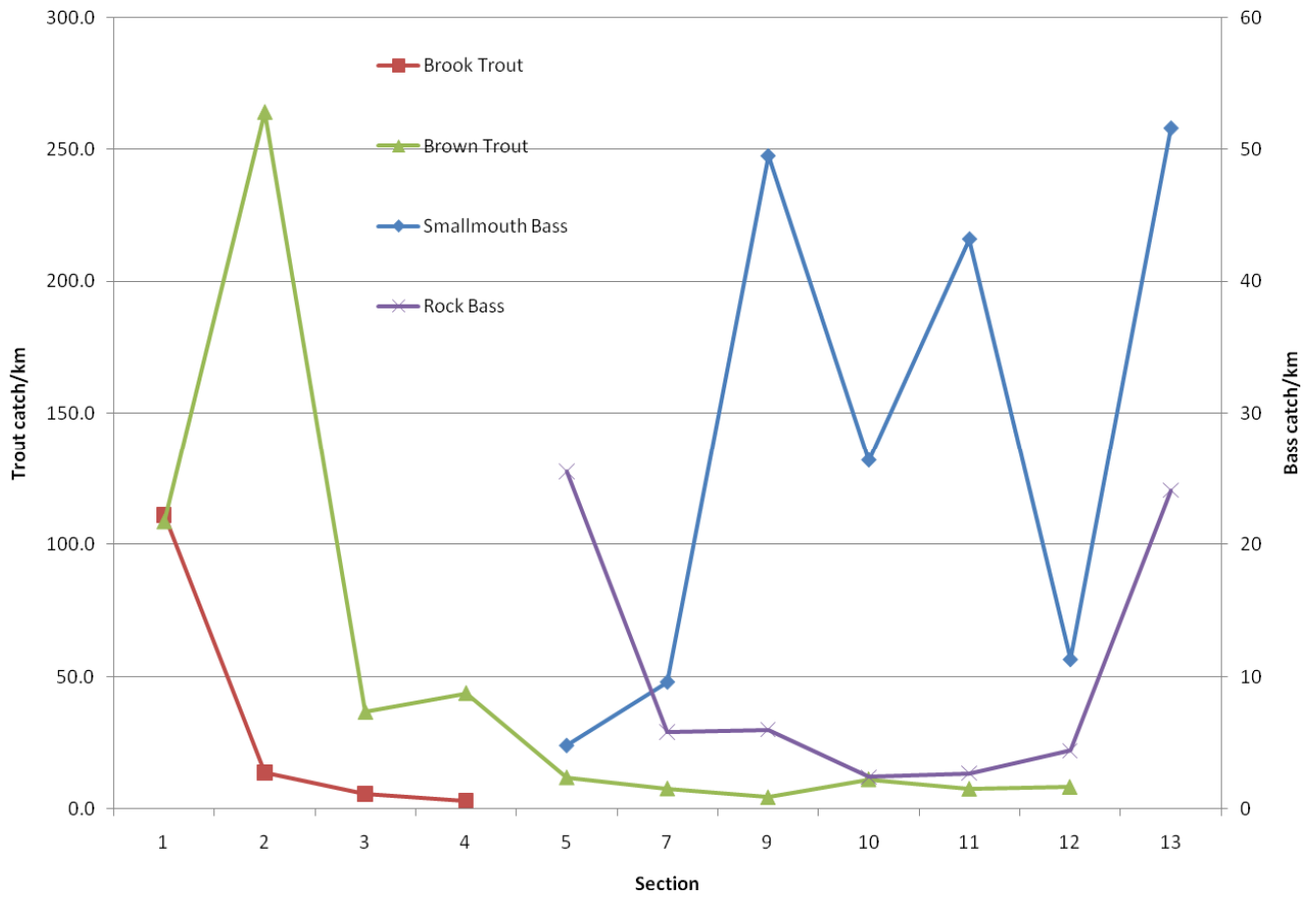


Figure 3. First pass electrofishing catch of brook and brown trout/km and smallmouth and rock bass/km by fisheries management section in Pine Creek.

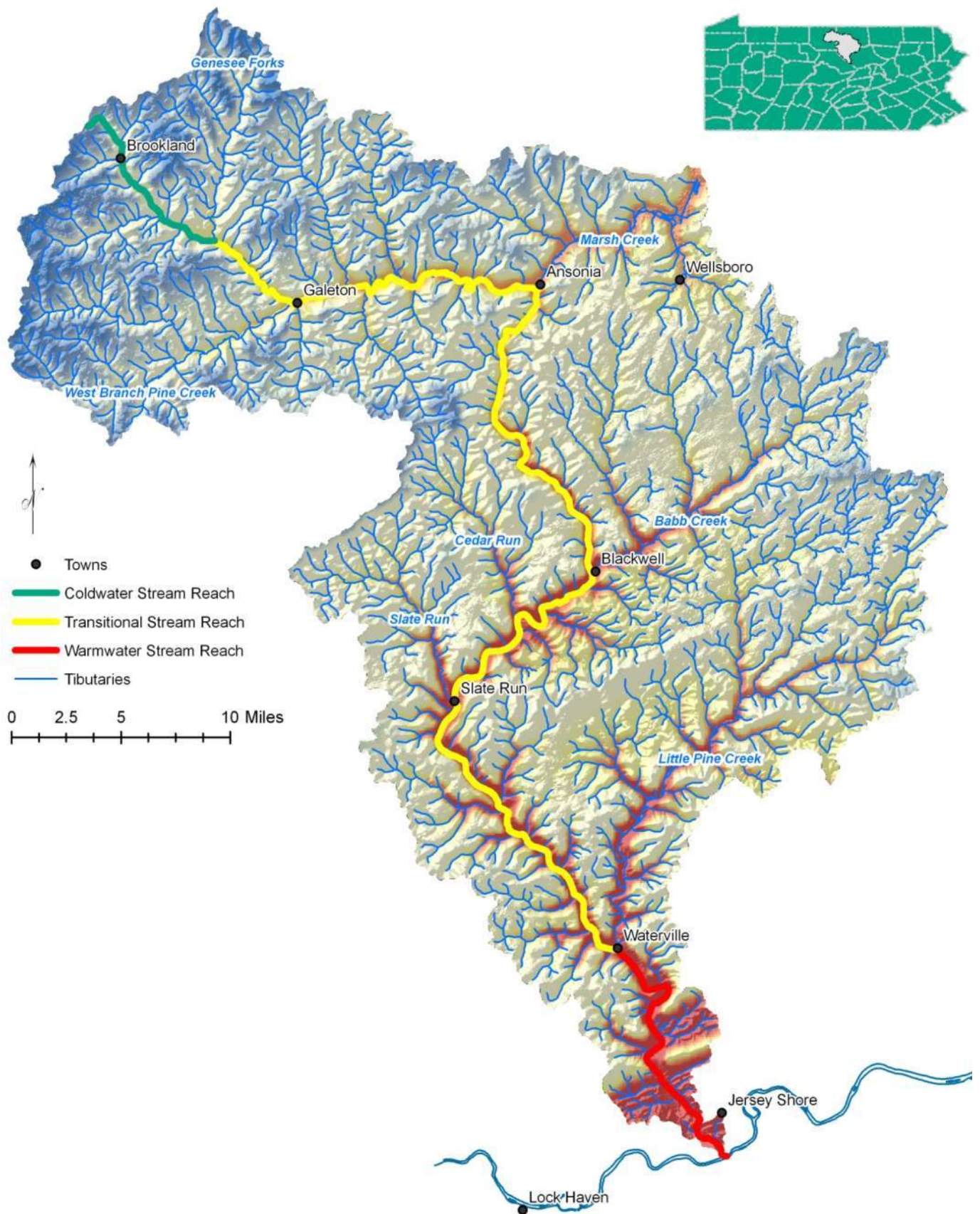


Figure 4. Pine Creek thermal classification.

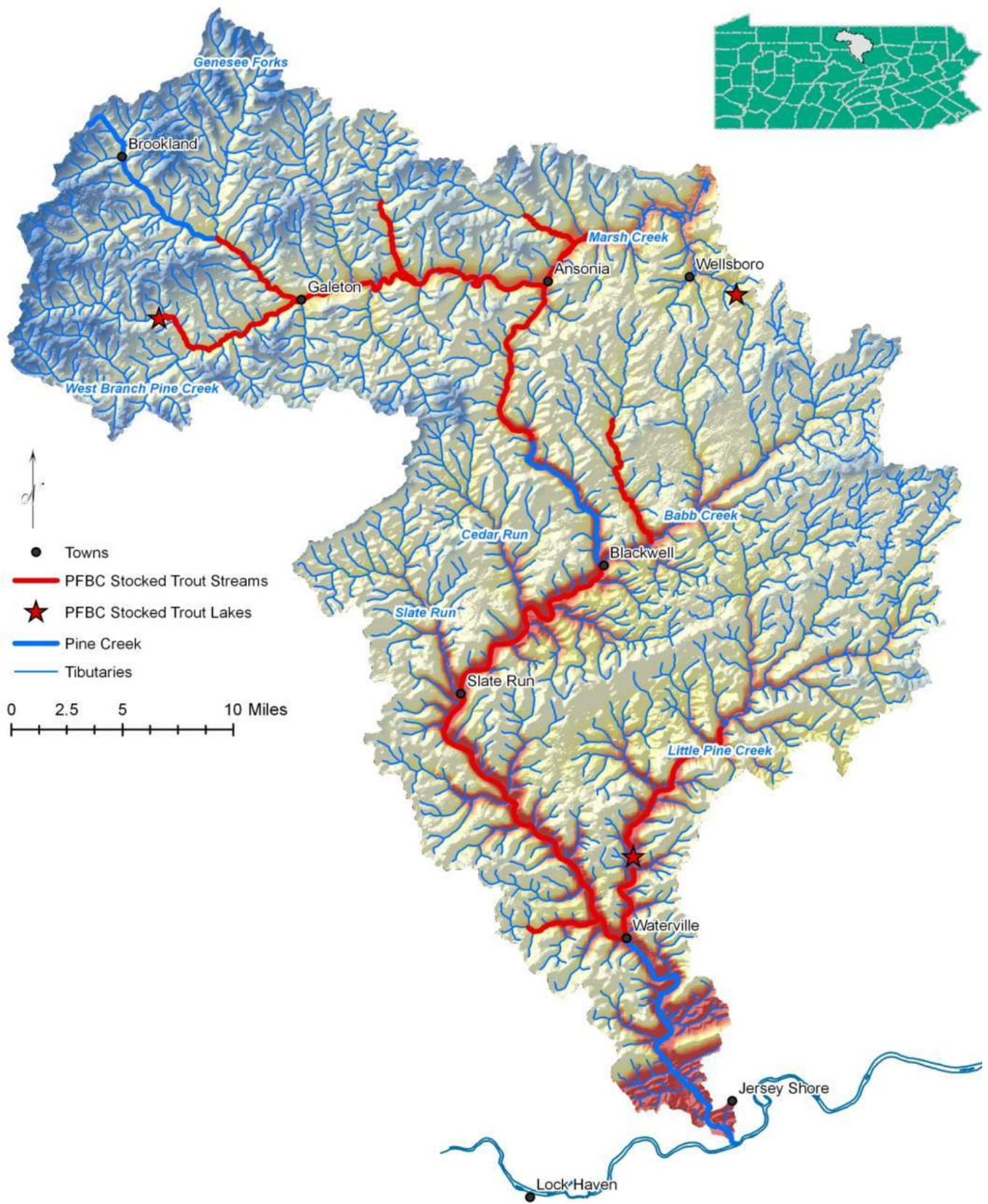


Figure 5. PFBC stocked trout resources in the Pine Creek Watershed.

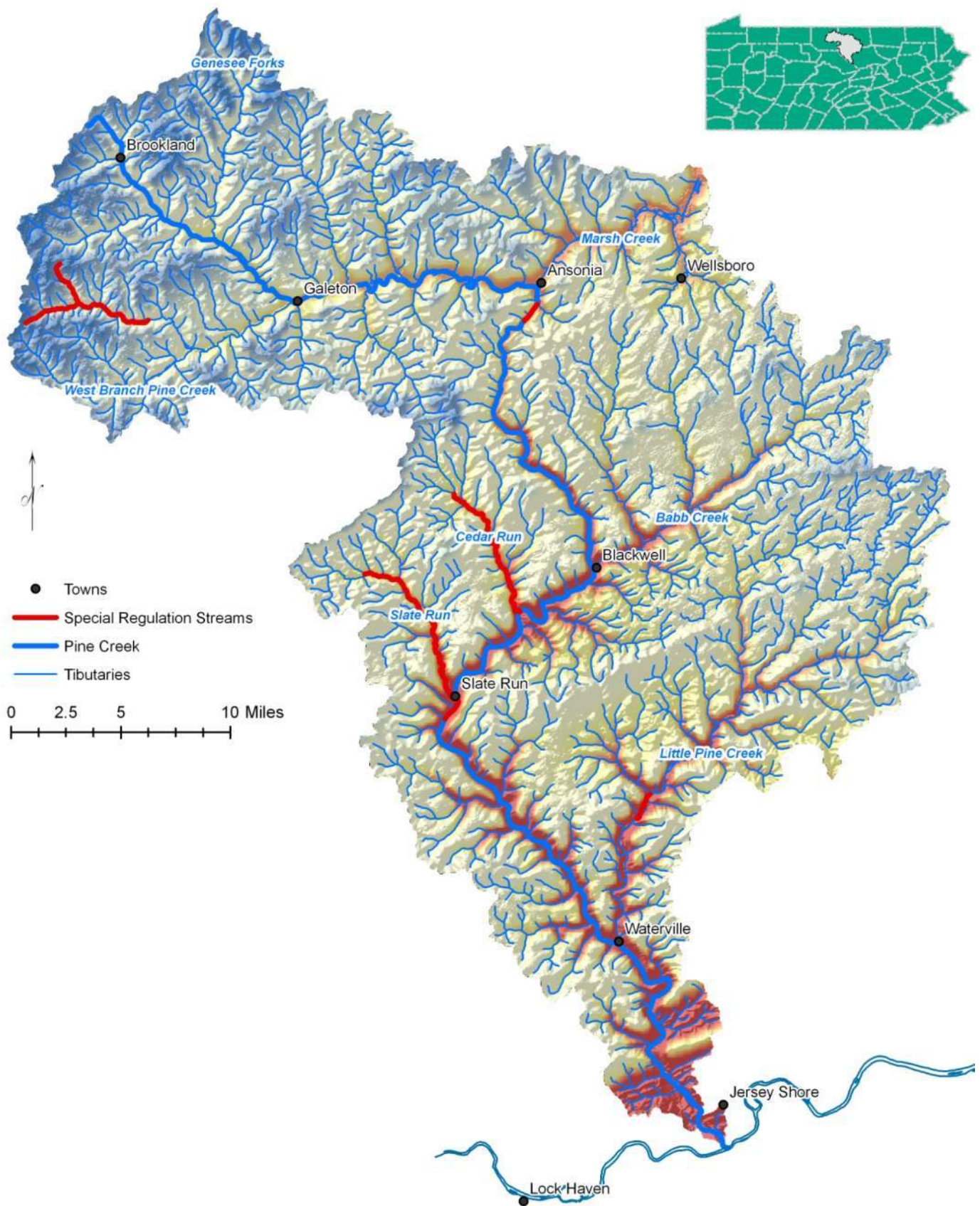


Figure 6. Special regulation waters in the Pine Creek Watershed.

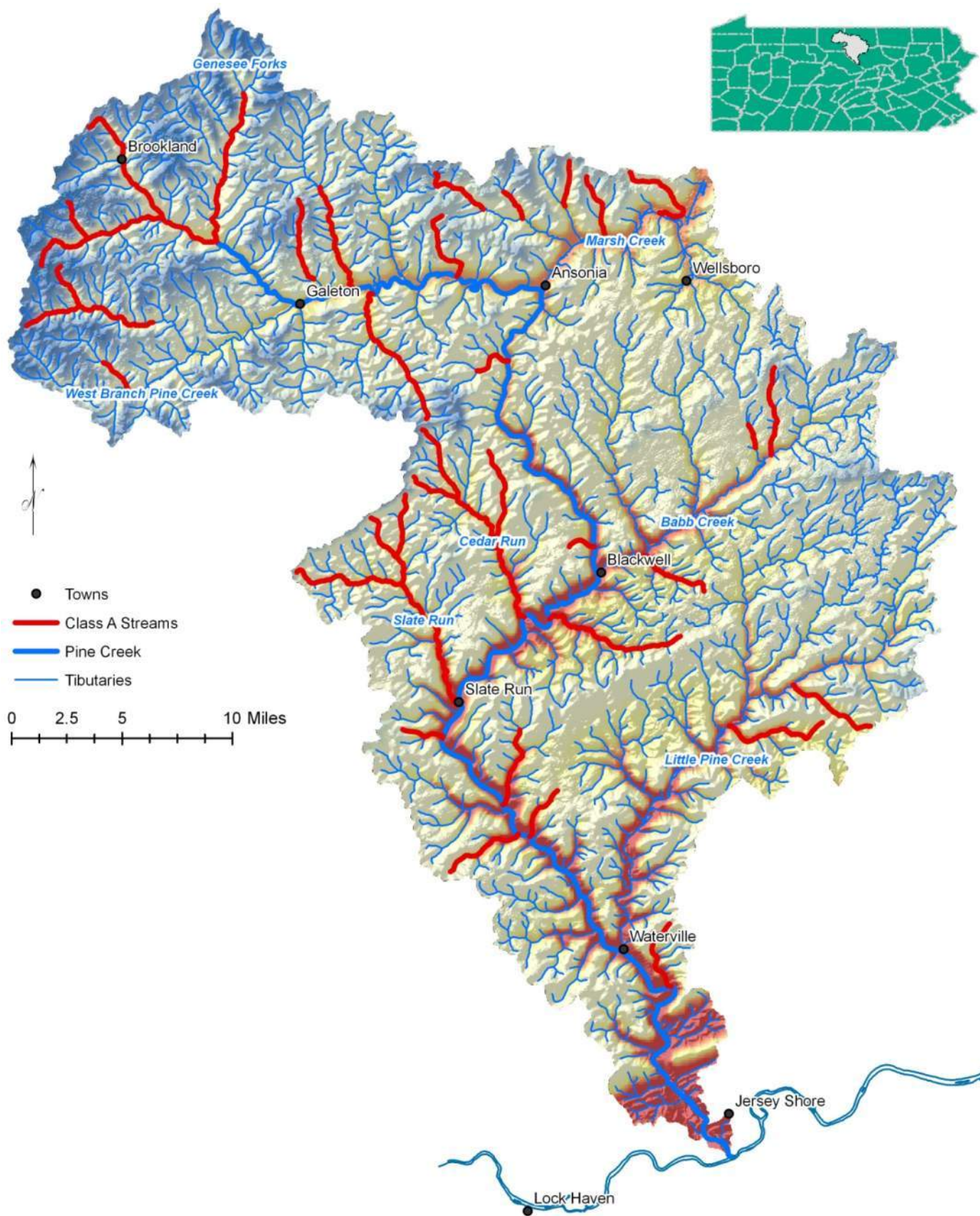


Figure 7. Class A Wild Trout Streams in the Pine Creek watershed.

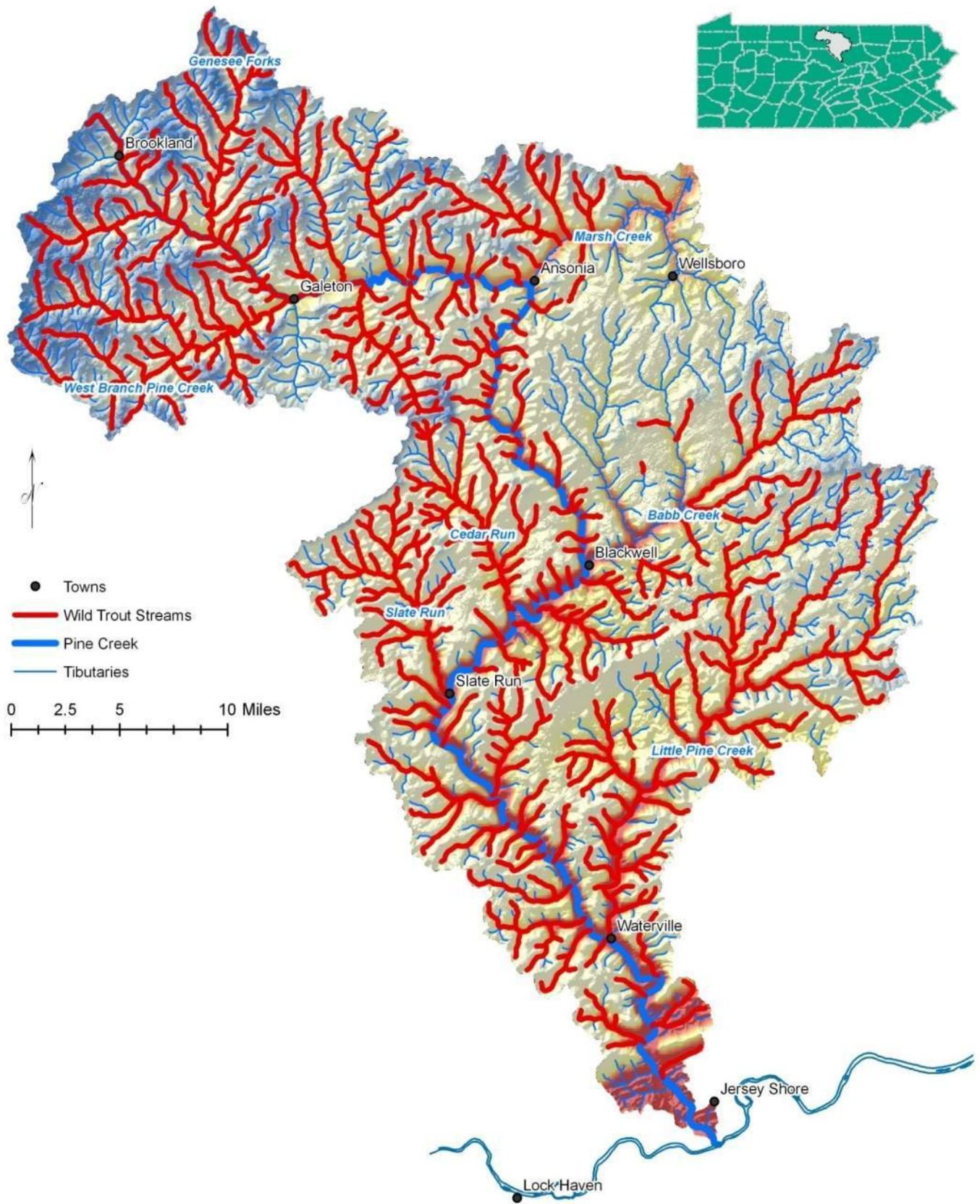


Figure 8. Naturally Reproducing Wild Trout Streams in the Pine Creek Watershed.

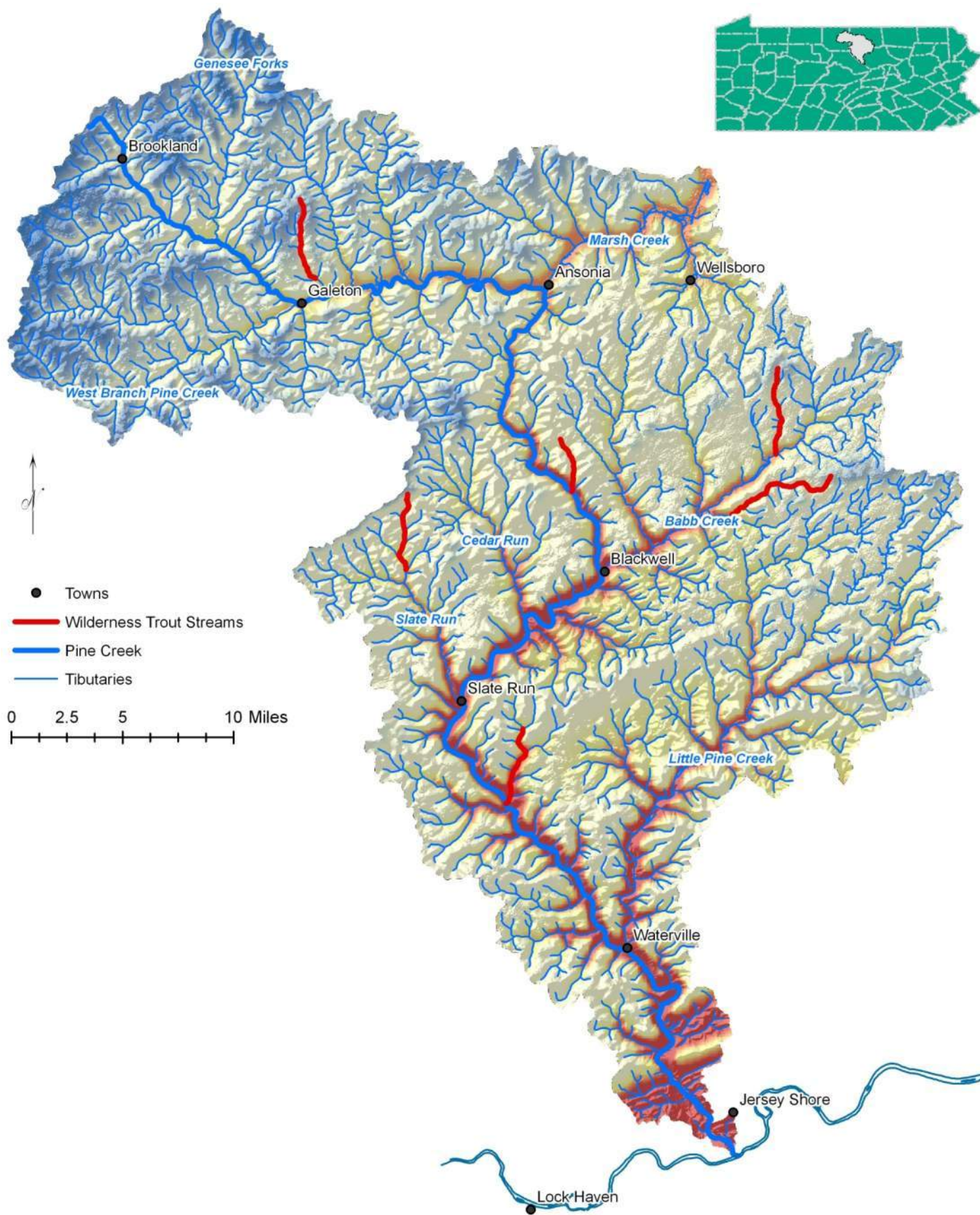


Figure 9. PFBC designated Wilderness Trout Streams in the Pine Creek watershed.

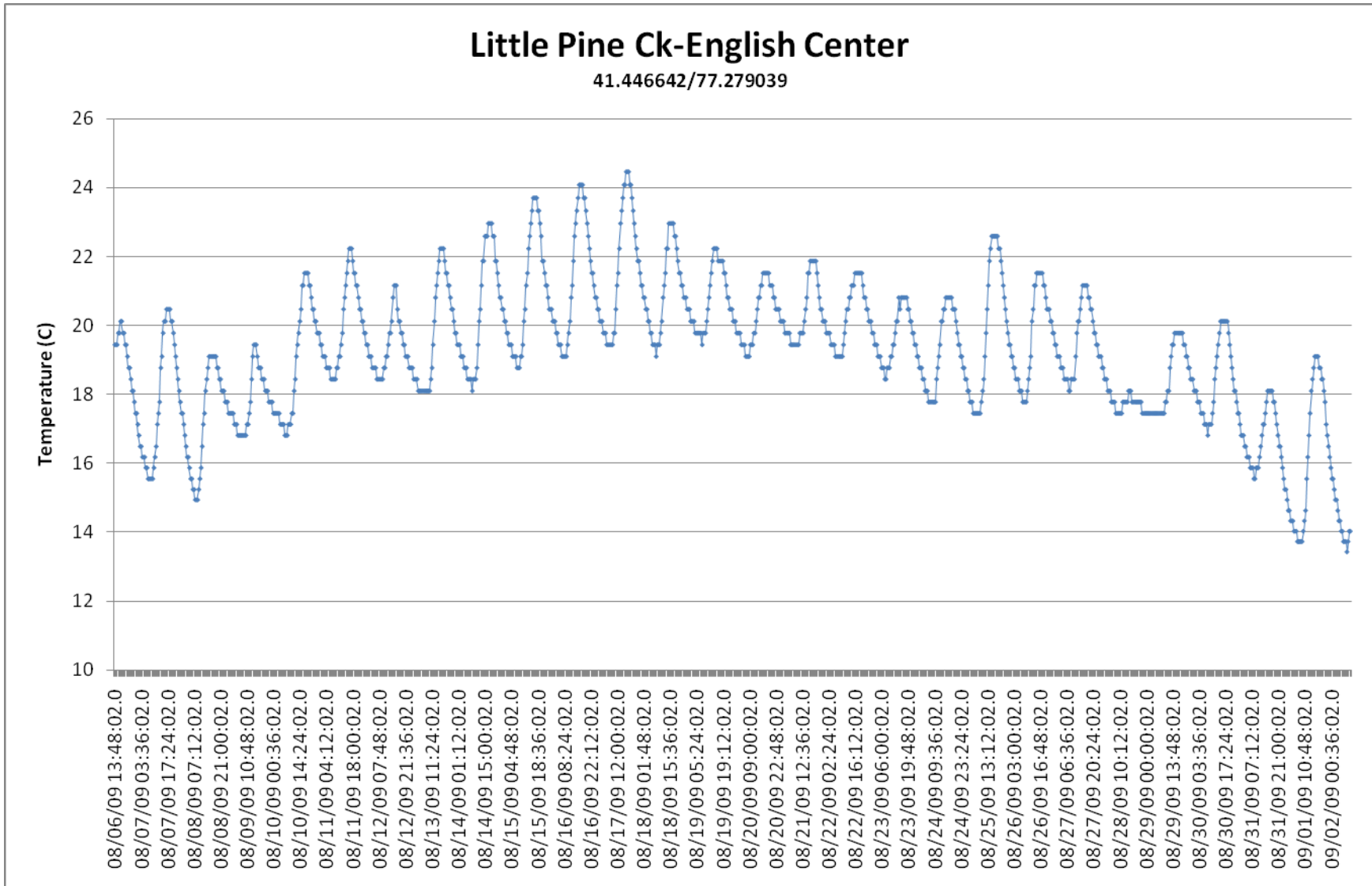


Figure 10. Little Pine Creek water temperatures near English Center during August 2009.

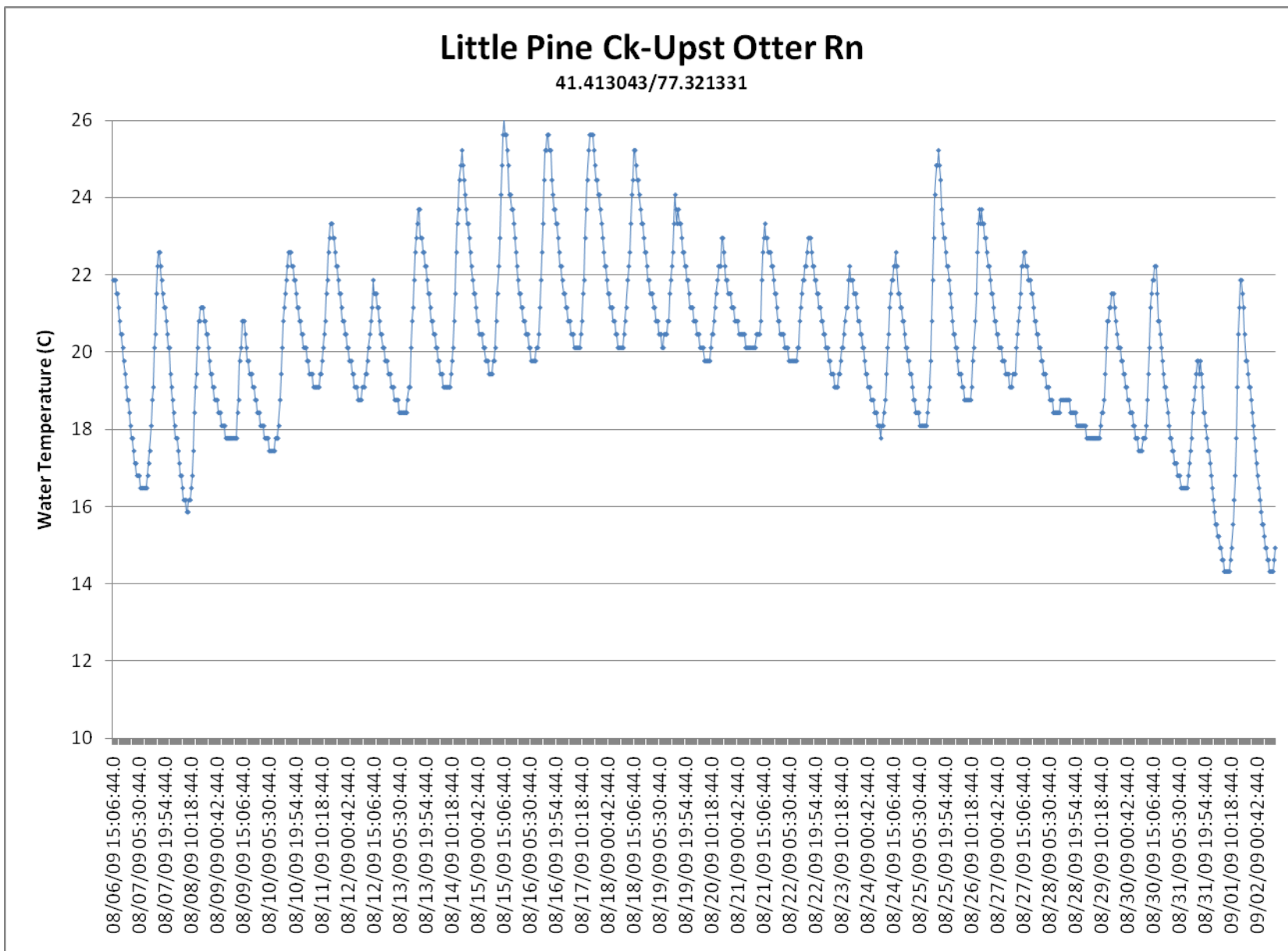


Figure 11. Little Pine Creek Water temperatures near Otter Run during August 2009.

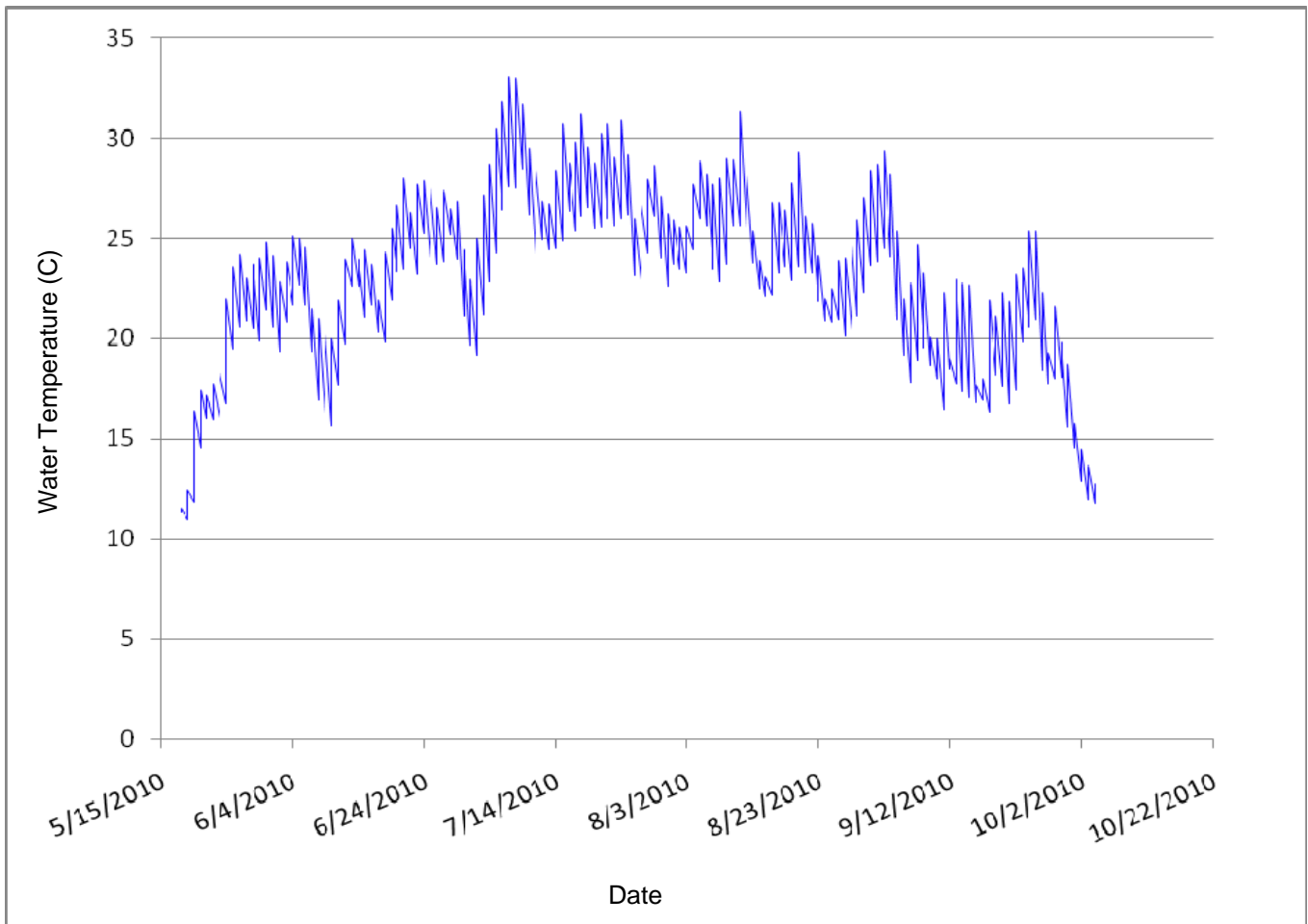


Figure 12. Pine Creek Water temperature data collected by DEP at Hamilton Bottom Access Area near Jersey Mills (Section 12) from May 18 - October 4, 2010 (DEP 2010).

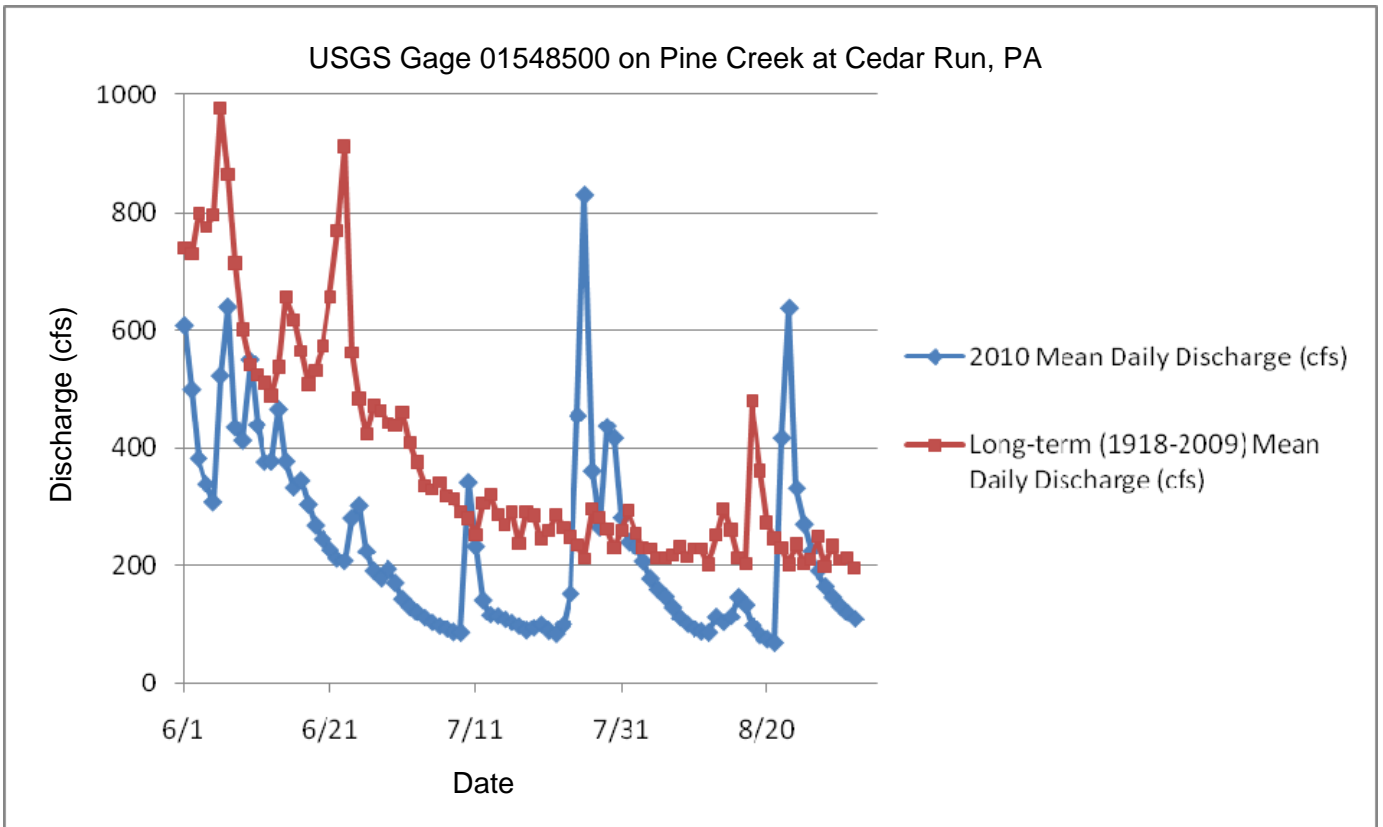


Figure 13. Mean daily discharge of Pine Creek at Cedar Run (USGS gage 01548500) in 2010 vs. the long-term (1918-2009) mean daily discharge. It is clear that summer 2010 flows can be characterized as below normal.