

Fishery Management Plan for Big Spring Creek (7B)

Bureau of Fisheries

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Executive Summary

Big Spring Creek was historically renowned for supporting a high-quality wild brook trout *Salvelinus fontinalis* fishery. Currently, the creek supports sympatric populations of brook trout, rainbow trout *Oncorhynchus mykiss*, and brown trout *Salmo trutta*. Big Spring Creek is unique relative to other wild brook trout fisheries in Pennsylvania, and is one of only four limestone spring streams afforded a Class A designation by the Pennsylvania Fish and Boat Commission (PFBC) based on wild brook trout biomass. Of these four Class A brook trout stream sections, Big Spring Creek, Section 01, supports the highest biomass of wild brook trout in the Commonwealth, as well as the highest biomass of wild rainbow trout in the Commonwealth. In general, the distribution of wild trout is concentrated in the upstream reaches of Big Spring Creek (Section 01 and the upstream portion of Section 02), with few trout occupying the middle and lower reaches of the stream (downstream portion of Section 02 through Section 04).

Throughout history, numerous impacts associated with agricultural activity and the operation of mill dams, clay mines, and trout hatcheries, have altered the chemical and physical characteristics of Big Spring Creek, resulting in severely degraded fish habitat conditions in some segments of the creek. Prior to 2010, instream physical habitat conditions were enhanced through various projects located between the headwaters and the Nealy Road Bridge (sections 01 and 02). The most recent and most extensive habitat enhancement project was completed during 2010. The goal of this project was to improve instream habitat conditions for the resident wild trout fishery, targeting brook trout if feasible. Project objectives included: (1) to improve instream habitat and riparian vegetative conditions for a variety of aquatic and terrestrial wildlife species; (2) to remove the remnants of the Piper Mill and Thomas Hatchery Dams, and implement habitat enhancement activities that would result in a natural-looking stream channel with appropriate dimensions (width and depth); (3) to increase habitat diversity and provide adequate habitat for all life-stages of trout, ultimately resulting in a sustainable, wild trout destination fishery; and (4) to monitor the pre- and post-implementation physical habitat and biological conditions, and to use monitoring information to guide additional restoration activities on Big Spring Creek and other limestone spring creeks.

In May 2012, the PFBC received \$586,600 from the Pennsylvania Turnpike Commission (PTC) for the design, permitting, construction, and monitoring of an additional 2,000 feet of habitat enhancement work on Big Spring Creek (Phase 2 Project) immediately downstream of the 2010 project reach. The Phase 2 Project is intended to meet stream mitigation requirements associated with the PTC's Total Reconstruction and Widening Projects proposed in the Conodoguinet Creek Watershed. The dramatic increase in the abundance of rainbow trout

observed in response to the implementation of the 2010 project, in conjunction with the PFBC's desire to optimize the brook trout fishery of Big Spring Creek, drove the impetus for this document. The purpose of this document is to provide an overview of the status of the Big Spring Creek trout fishery, describe the results of the 2010 habitat enhancement project and implications for future habitat enhancement, and to present options to guide future fishery and habitat management activities at Big Spring Creek. In addition, implications of native versus non-native sport fish management are presented.

A review of brook and rainbow trout habitat suitability information reported in various published literature and fisheries agency reports indicated that nearly all of the physical habitat and fish cover conditions observed in the 2010 project model reach were within the optimal range of values for adult, juvenile, and spawning brook trout. However, the implementation of the 2010 Project did create some habitat conditions different than those observed in the model reach which were beneficial to adult and spawning rainbow trout. For example, the 2010 project increased thalweg and mean depth to values significantly greater than those of the model reach. Although these conditions were within the optimal ranges of adult brook trout they also favored rainbow trout. The project also resulted in an increase of mean water column depth conditions for juvenile rainbow trout from suboptimal to optimal conditions. In addition, the 2010 project resulted in an increase in the percent cover for adult fish (cover in water at least 1 ft deep, and suitable for fish at least 200 mm (8 in) in total length) in the project reach to conditions that substantially exceeded those observed in the model reach.

Based on brook and rainbow trout habitat suitability information reported in the literature and data collected in the model reach, future habitat enhancement activities in the proposed Phase 2 Project reach (Willow Tree reach) will address several key habitat parameters. Based on the affinity of rainbow trout for deep water, thalweg depth will be reduced to just below the lower limit of the optimal range for adult rainbow trout. Mean water column depth conditions will be increased to conditions similar to those of the model reach, which are within the optimal range for all life-stages of brook trout and generally suboptimal conditions for adult rainbow trout. The existing, relatively high percent fine gravel composition of the substrate will be maintained, and the amount of adult fish cover provided by objects other than aquatic macrophytes will be increased to conditions similar to those of the model reach. Wetted width/depth ratio values will be reduced to values similar to those observed in the model reach in an effort to reduce: (1) the amount of water surface area exposed to solar radiation, (2) late-afternoon aquatic macrophyte photosynthesis levels, (3) the rate at which the creek's waters warm as they flow downstream, and (4) late-afternoon dissolved oxygen and total dissolved gases percent saturation values. In addition, efforts should be made to increase water surface turbulence to aerate the creek's waters and possibly prevent dissolved gas supersaturation conditions in the Willow Tree reach and downstream segments of the creek.

Future habitat enhancement activities will be designed to create habitat conditions which are optimal for brook trout, but suboptimal for rainbow trout. However, published information about the habitat requirements/preferences of stream-dwelling brook and rainbow trout indicate that the habitat preferences of these species are very similar. Furthermore, the short-term response of the Big Spring Creek trout fishery to the implementation of the 2010 project, and published information about other sympatric brook and rainbow trout populations, suggest that

any habitat modifications in Big Spring Creek that benefit brook trout will most likely also benefit rainbow trout to some degree.

At this time, the PFBC will continue to manage Big Spring Creek, sections 01 and 02, as a mixed brook, rainbow, and brown trout fishery, but will manage the fishery preferentially for brook trout. Initially, non-native salmonids will not be removed from the creek, and future habitat enhancement of Big Spring Creek will be designed to favor brook trout. Sampling results in 2011 documented that the brook trout population increased in the project reach, but the rainbow trout population increased much more. Population monitoring in 2012 is promising in that rainbow trout numbers have declined since 2011 and brook trout have continued to increase. However, published information about response times of trout fisheries to habitat enhancement activities range from seven to ten years, and this timeframe is incorporated into the following fishery management objectives for Sections 01 and 02 of Big Spring Creek. Objectives pertaining to this management strategy include: 1) achieve and maintain a total salmonid density comprised of brook, rainbow and brown trout of greater than or equal to 90.00 kg/ha in sections 01 and 02, within seven years of completed habitat enhancement projects; and 2) achieve and maintain a total salmonid species abundance (number/km) composition of at least 70 percent brook trout to 30 percent rainbow and brown trout in these sections of Big Spring Creek, within seven years of completed habitat enhancement projects. In addition, PFBC staff will propose miscellaneous special regulations at Big Spring Creek, sections 01 and 02, beginning in January 2014. This regulation would restrict gear to fly-fishing tackle only and catch-and-release of brook trout, but permit harvest of five rainbow and brown trout per day greater than or equal to seven inches. If approved by the Commissioners, the regulation proposal will be posted in the Pennsylvania Bulletin for public comment following the January 2013 Commission meeting.