LYNN CAMP PRONG BROOK TROUT RESTORATION PROGRESS REPORT

Great Smoky Mountain National Park

Pete Yeomans Photo

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BACKGROUND

In 2008 Great Smoky Mountains National Park (GRSM) partnered with numerous state, federal and NGO's to restore 10.2 km (6.4 miles) of Lynn Camp Prong and 2.2 km (1.4 miles) of Marks Creek for brook trout using the fish pesticide Fintrol® (antimycin) to remove non-native rainbow trout. The restoration effort utilized 31 people from 8 different agencies (4 federal; 3 state; 1 university) over a two week period to complete the project.

In late July 2009, approximately 340 "Southern Appalachian" brook trout were collected from three streams and released into the first mile of the project area. Due to increasing water temperatures, additional releases were delayed until late September and early October 2009. During that time frame, approximately 1,500 brook trout were collected from seven streams and released throughout the project area. Of those, 809 fish were released in the upstream most 4.3 km of the restored stream section. Approximately half of these fish were released in sites 46 – 53 (800 m) and half in sites 66 – 70 (500 m), or about 50 – 80 brook trout/100 m of stream. The more remote stream sections had no brook trout introduced into them. Based upon the results of previous restoration efforts, the Lynn Camp treatment area should reach pre-treatment densities within the next three years (Figure 1).

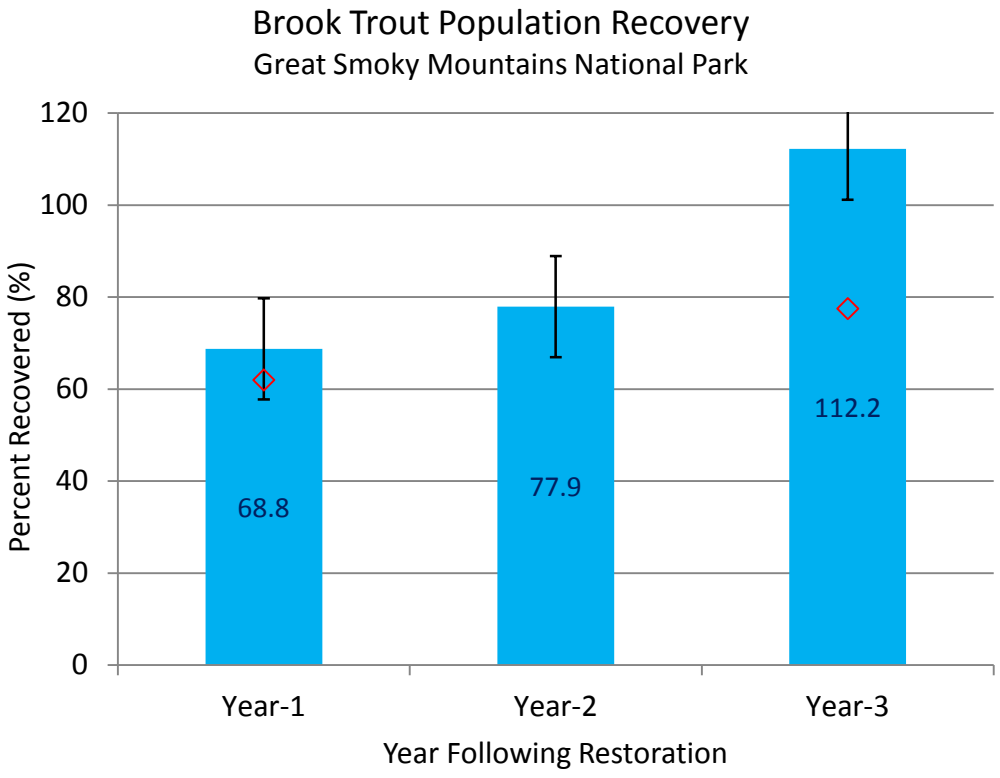


Figure 1. — Graph depicting expected brook trout population recovery (%) in each of three years immediately following restoration based upon recovery times from previous restoration projects. For each population depicted in the figure, native southern Appalachian brook trout were transplanted into the restored stream section and population abundance surpassed pretreatment values via natural reproduction and recruitment.

Surveys in June and July 2009 collected a handful of rainbow trout in two locations in Lynn Camp Prong. The exact reasons these fish were not eliminated are not clear but appears to be tied to the fact that bears tore into most of the fish cages during treatment. This eliminated the sentinel fish that are used to determine the effectiveness of the day's treatment and the distance the chemical was traveling. Many times, sentinel fish that died after limited exposure were replaced with fresh rainbow trout to ensure the treatment was effective. Project managers suspect some of the fish that were found were most likely fresh rainbow that escaped from the cages that bears tore into and simply did not have enough exposure time to kill them. These sections were re-treated with Fintrol® in late July to remove the remaining rainbow trout. Follow up electrofishing surveys of these and other stream sections collected no rainbow trout.

Surveys in June 2010 to evaluate the survival and reproductive success of the reintroduced brook trout discovered that rainbow trout had been illegally stocked into the project area. The illegal introduction was verified by the presence of two rainbow trout of hatchery origin in the four adults initially collected. Fishery staff electrofished the remainder of the project area and collected an additional 29 adult and 33 young of the year rainbow trout, providing evidence that the fish had been stocked prior to spawning (Figure 1). Managers decided at this point to continue electrofishing efforts with the goal of eliminating all adult rainbow trout from the stream and thus eliminate the possibility of spawning in the spring of 2011. During this process, project managers also realized that a 60m section of a tributary stream containing a small number of rainbow trout had not been treated in 2008. Steps were immediately taken to eliminate this source of rainbow trout. By mid-August 2010, 209 young of the year (YOY) and 57 adult rainbow trout were removed from 2.9 km (1.8 miles) of the original project area (Figure 2).

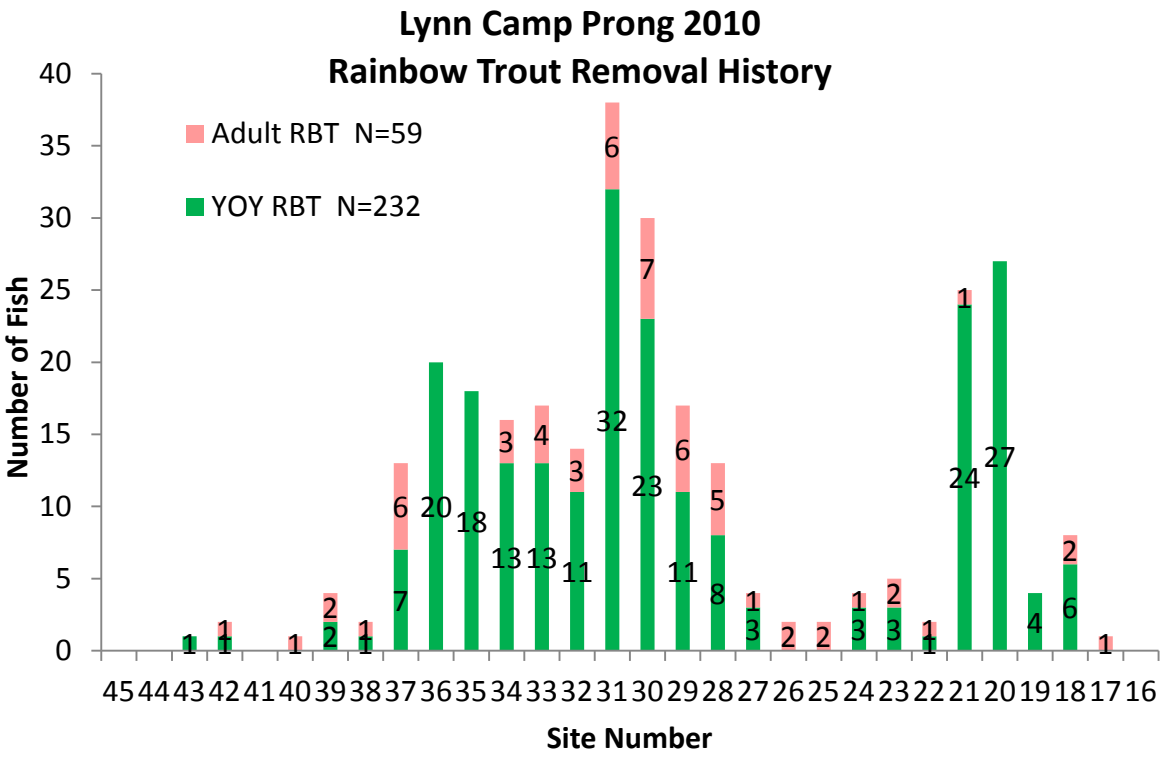


Figure 2.—Distribution of rainbow trout removed from a 2km section of Lynn Camp prong using backpack electrofishing gear during the summer of 2010. Sites were numbered in 100m increments starting with 'site 1' at the downstream barrier to site 86 at the upper end of the treatment zone. Rainbow trout were found in sites 17 through 43.

Based upon the presence of numerous young-of-year (YOY) and adult rainbow in the lower 4.6 km of treatment area, the decision was made to retreat the lower section to eliminate the rainbow trout. At that time, GRSM did not have enough antimycin on hand to treat the lower 4.6 km of the stream. In addition, given brook trout had already been reintroduced to the lower 4.6 km segment, they would have to be temporarily removed and held offsite during treatment, then restocked into the treatment zone. Large pools in local stream segments (within 6.4 km) were identified to serve as holding areas for brook trout removed from the treatment zone. Knowing not all brook trout could be recovered from the holding pools, additional brook trout transplants were scheduled to supplement the lower 4.6 km after the re-treatment was completed.

STUDY OBJECTIVES

Project objectives outlined in the 2011 BTJV funding proposal were:

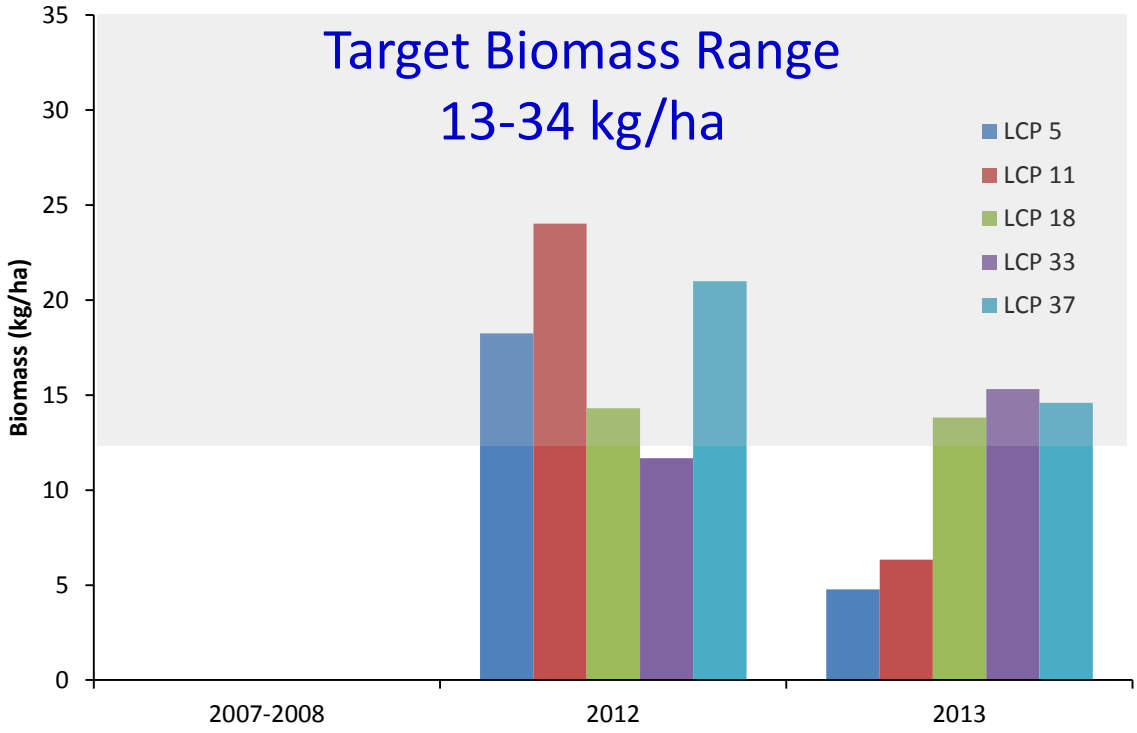
1. In 2011, sample the stream to determine the distribution of rainbow trout and establish the treatment area.
2. Complete an amendment to the existing Environmental Assessment (EA) so that so that rotenone can be used to retreat as Fintrol® (antimycin) is not available.
3. If this effort is successful, collect and stock approximately 1,000 – 1,500 brook trout to supplement the existing population in September and October 2011.

RESULTS

Five public meetings were held in/around the Park during spring 2011 to discuss native fish restoration goals, with the major focus on relating these goals to the preservation of local heritage. Planning began to retreat the lower 3.0 miles of Lynn Camp Prong in fall 2011. GRSM staff acquired enough antimycin from units leftover from the 2008/2009 treatments as well as additional units shipped from Rocky Mountain National Park. Given the antimycin source, GRSM did not have to amend the EA to approve the use of rotenone for the treatment. Prior to the retreatment of Lynn Camp Prong, 725 brook trout were removed by electrofishing and transported to refuge streams outside of the treatment area (Figures 5-10). The lower 4.6 km (3.0 miles) was successfully retreated in September 2011 using the piscicide antimycin. After retreatment, 472 (65.1%) brook trout were re-collected from refuge streams and placed back in Lynn Camp Prong. An additional 759 brook trout were collected from three other GRSM streams and transported to Lynn Camp Prong.

In 2012 and 2013, fisheries staff aided by volunteers from Trout Unlimited surveyed five Lynn Camp sites to determine: 1) if all rainbow trout had been removed during the retreatment of 5.3 km (3.3 miles) of the stream in 2011 and 2) the survival and reproductive success of reintroduced brook trout. Population surveys in 2012 indicated that brook trout had successfully spawned and that population density was about 34 – 90% of pre-treatment rainbow trout densities. These values appear to be related to the locations where brook trout were released after treatment (Figure 3).

Figure 3. — Brook trout population recovery two and three years after retreatment of Lynn Camp Prong using the fish piscicide antimycin.



Survey data from the five sites sampled in the lower 5.3 km of stream indicate that the re-introduced brook trout did survive and reproduced in both 2012 and 2013, although reproductive success was poor both years (Figure 4). Major flood events between January and May of 2012 and 2013 limited YOY production in these years. Due to the limited reproduction, there was little recruitment to age-1 and age-2 sizes in subsequent years. Data from the five sites in 2013 indicated that brook trout biomass was 18-45% of pre-treatment rainbow trout biomass (34 kg/ha) (Figure 3). Lack of reproduction and recruitment appears to delayed population recovery within the typical 3 years (Figure 1). Plans for 2014 are to transplant additional adult and age-0 SABT from source streams in 2014 to "jump start" reproduction and recruitment of the lower Lynn Camp population.

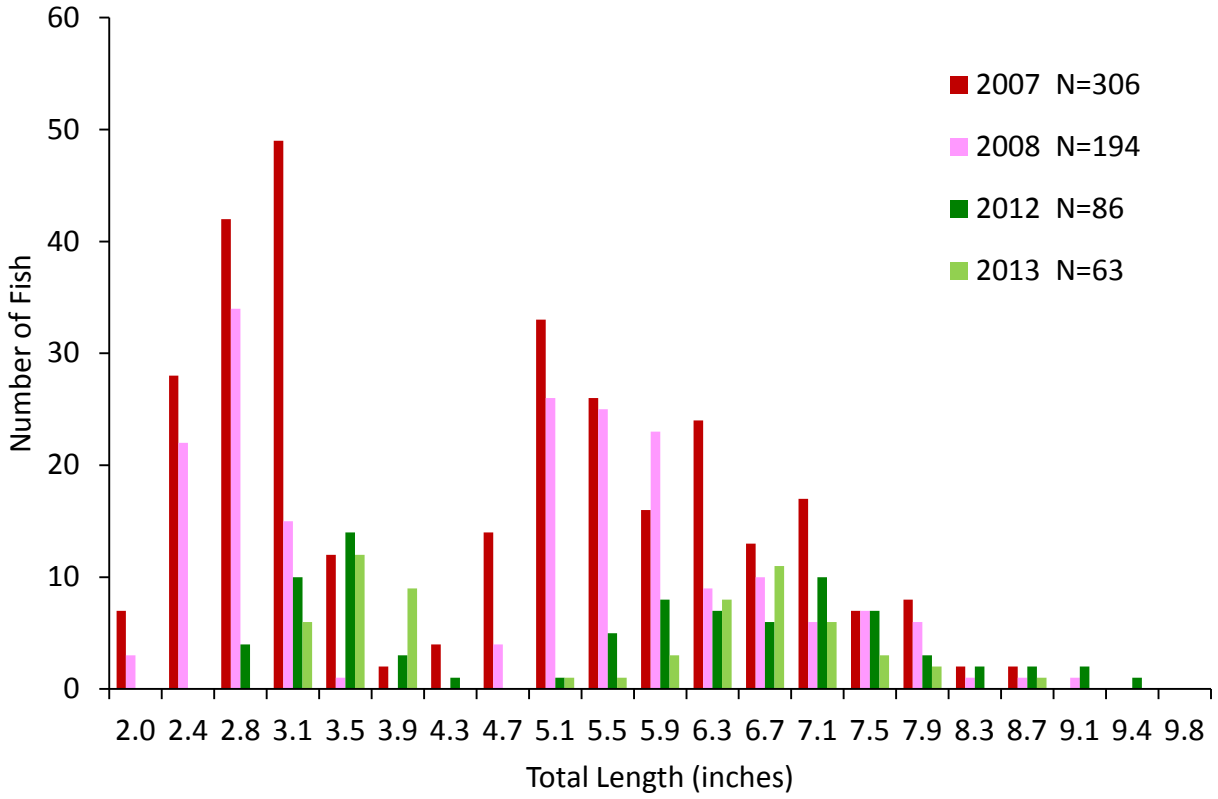


Figure 4. — Length frequency distribution of rainbow trout and brook trout collected from three sites on the lower 4.6 km of Lynn Camp Prong between 2007 and 2013. Rainbow trout data comes from pretreatment surveys, whereas brook trout data is from post-treatment surveys.

Figures 5-10: Project photo's clockwise starting from top left: GRSM fisheries crew members' electrofish a section of Lynn Camp Prong trying to remove non-native rainbow trout illegally reintroduced into the stream. A GRSM fishery technician places southern Appalachian brook trout into a backpack transporter just after collection on Toms Creek. Two trout Unlimited volunteers place YOY and adult brook trout into a holding cage prior to transport to refugia pools during treatment. A group of Trout Unlimited volunteers assisting with the collection of brook trout prior to transport to local refugia. Fish biologists and technicians from TN Wildlife Resources Agency and the National Park Service survey Lynn Camp Prong after re-treatment to ensure no rainbow trout are present and evaluate brook trout density. Additional brook trout are collected and placed into backpack transporters for subsequent release into Lynn Camp Prong.