

2006 Progress Report



Bull Trout X Brook Trout Hybrid captured in Swan Lake



Swan Lake

**Swan Valley Bull Trout Working Group
May, 2007**

Background

The Swan Valley has historically been home to a stable, healthy bull trout population. In 1998, anglers began to occasionally catch adult sized (20-30 inch) lake trout from Swan Lake and the Swan River. This was alarming because lake trout are not native and are notorious for ultimately dominating lakes at the expense of bull trout and kokanee salmon. In 2003, the level of concern was compounded when biologists gill netted a 9-inch juvenile lake trout from Swan Lake, indicating that wild reproduction was occurring. A similar survey in 2004 captured 7 more juvenile lake trout. In 2005, biologists captured 28 juvenile lake trout, mostly 9-12 inches long.

These findings inspired the formation in 2005 of a Swan Valley Bull Trout Working Group. The SVBTWG is composed of five government agencies, namely Montana Fish Wildlife and Parks (MFWP), Montana Department of Natural Resources and Conservation (DNRC), Confederated Smallish and Kootenai Tribes (CSKT), U.S. Fish and Wildlife Service (USFWS), Flathead National Forest (Forest Service) and Trout Unlimited. The group signed a Memorandum of Understanding which pledged to collaborate and share resources to “ensure the long-term, self-sustaining persistence of bull trout as the dominant piscivore within this (Swan) ecosystem”.

The SVBTWG expressed concern that: *“If left unchecked, it is a matter of time until lake trout will become the dominant fish in the Swan River ecosystem”*. In the past two years the group has made substantial progress in addressing the lake trout threat. This summary represents a progress report on those SVBTWG efforts to date and future plans.

* For .pdf copies of the annual reports and other attachments, click on “Swan Valley Bull Trout Working Group” information on the Montana Trout Unlimited website:

>www.montanatu.org<

Public Education

The SVBTWG fully recognizes the necessity of good communication with the public. We agreed to strive toward a high level of angler awareness of the problem. We encourage angler participation in tracking and reducing the lake trout threat. We also seek to understand what fishery management actions the public will support in order to protect the existing Swan Lake fishery. Controversial actions, such as lake trout suppression, may become necessary in the future and we are committed to communicating early and often with the public on those issues.

- SVBTWG developed a brochure that describes the threat of lake trout in the Swan system and we’ve posted informative signs requesting cooperation in reporting catches and voluntarily harvesting lake trout. MFWP printed 5,000 brochures and about 2,000 have been distributed to date.
- The SVBTWG hired a “bull trout ranger” in the summer of 2005. This temporary employee conducted informal creel surveys and angler opinion surveys. His presence helped spread the word to anglers about the new threat of lake trout.

- We continue to provide education and information to those who share our concerns for the Swan Lake and River fishery resource.

Research Accomplishments

At the beginning of 2005, one of the greatest challenges faced by SVBTWG was limited distribution and abundance information about the lake trout population. The population dynamics of new invasions (e.g., low numbers, small fish) make it problematic to study them. The SVBTWG focused on gathering additional baseline information and began searching for favorable methods to address the increasing lake trout population. Some of the basic questions are: “How big a problem to other fish species are lake trout in the Swan system? What are the current dimensions of the lake trout population and how rapidly is it expected to grow? Is it possible to suppress lake trout in Swan Lake and can we do so without harming other species?” The following discussion details significant progress made in 2005 and continuing in 2006 on initial research objectives.

- Initial netting information, along with absence of any reported angler harvest of lake trout in Swan Lake in 2005, suggests that populations of adult lake trout are low. However, the juvenile population of lake trout appears to be rapidly expanding. We had anticipated in the near future these fish would begin to reach catchable size.
- A graduate student project was initiated, beginning in 2006, in conjunction with MFWP Bonneville Power Administration (BPA) mitigation research and the Montana State University Cooperative Fishery Research Unit. The graduate student with assistance from the Forest Service conducted gill netting in order to assess the extent of lake trout distribution, search for adult spawners, and characterize population demographics. This effort, which was notably more intensive than previous netting, captured 194 lake trout. The lake trout were well dispersed throughout the deeper portions of the lake (see Appendix A). Six of those fish received sonic transmitter implants so their fall movements could be tracked. About 100 lake trout were released alive with small implanted PIT tags so that they could be positively identified if recaptured in the future. While the deeper portions of the lake where lake trout were believed more likely to reside were targeted, it is noteworthy that lake trout outnumbered bull trout in the catch nearly 2:1. The length frequency of the lake trout captured confirmed that this is a young and expanding population. Most fish were between 225 and 350 mm in length (9-14 inches), with only two adult sized lake trout (21 and 24 inches long) captured.
- Plans were developed for 2007 to conduct a more intensive fall inventory of the lake trout population. USFWS funds were secured to contract with a fishery consultant from the Great Lakes, with expertise in deepwater trap netting and gill netting. The consultants have been refining their lake trout capture techniques in

Lake Pend Oreille and Upper Priest Lakes in north Idaho for the past two years and will use similar tactics during late September and early October, 2007. Their task is to capture, mark and release as many live lake trout as possible in Swan Lake. The graduate student will also begin telemetry on some of the larger lake trout captured in order to locate their spawning areas. The intended result is a comprehensive lakewide population estimate for lake trout, with a marked population that can be used for future assessments. **By late 2008 (following graduate study results) MFWP will apply acquired information and make an informed decision to either enter into an active and aggressive lake trout suppression program on Swan Lake or not.**

- The U.S. Forest Service awarded a contract to produce a GIS-linked bathymetric and substrate map of Swan Lake. Using cutting-edge technology, the contractor generated a map and database that allows us to query various sites, depths, or substrate classifications to pinpoint habitats that could be used for lake trout spawning or rearing. The contractor produced maps (see Appendix B) which are currently being ground-truthed and field tested. It is anticipated that the maps will be indispensable in understanding lake trout distribution and assisting us in finding potential lake trout spawning locations.

Monitoring of Bull Trout and Ecosystem Trends

The ultimate goal of the SVBTWG is the protection of the existing bull trout populations and mixed species fishery in the Swan drainage by minimizing negative impacts of lake trout. For that reason, it is important to track bull trout populations and other indicators to gauge success. The following annual MFWP monitoring accomplishments are useful in that respect.

- This was the 25th consecutive year MFWP has conducted bull trout spawning site (redd) counts in the Swan drainage. The four annual index stream sections (Elk Cr., Goat Cr., Squeezer Cr., and Lion Cr.) had a total of 489 redds in 2006, which is about 60 more than the past four years (2002-2005) and very similar to the three years prior. Overall, conditions were very good during the 2006 surveys. This is an indication that the adult bull trout population in Swan Lake is still healthy and robust.
- Spring gillnet monitoring was conducted during 2006. Netting on Swan Lake has been conducted annually since 1995 in an effort to assess long term trends. We caught four lake trout during 2006 in seven sinking gill nets (0.6 per overnight net). Bull trout trends for this netting series has remained fairly stable over time. The 1995-2005 average was 2.3 bull trout per overnight sinking net, and the 2006 catch was 2.1 bull trout per sinking net.
- From April 17 until May 22, 2006 through the collective efforts of SVBTWG members we fished three different types of trap nets in the southern portion of Swan Lake, in an attempt to capture lake trout during spring when surface water temperatures were relatively cool (44-55° F). We deployed two Merwin trap nets, three 4-foot diameter fyke trap nets with 50-foot leads, and three cod traps. A

total of 1,258 fish were collected in traps, representing 18 different species. Of the total, 145 were game fish, including six bull trout and zero lake trout. We concluded all three types of trap nets were ineffective in capturing lake trout.

- MFWP and USFWS crews conducted population estimates on lower and upper reaches of Goat, Squeezer, and Lion Creeks in the Swan valley, upstream of Swan Lake. These systems had been previously identified as being important spawning streams for bull trout and had previously exhibited significant evidence of hybridization between bull trout and brook trout. The goal of this effort was to better understand the system-wide implications of bull trout x brook trout hybridization within the drainage. Results will be further reported in 2007. Preliminary results of the genetic analysis determined that about 53% of sampled fish were bull trout, 38% were brook trout, and 9% were hybrids (Appendix C). These findings may be significant in that lake trout introduction may not be the only factor acting within the drainage to reduce bull trout numbers
- This was the 16th year conducting spawning inventories of the southeast shoreline on Swan Lake. MFWP estimated 1,235 kokanee redds, representing a slight reduction over the long-term average of 1,372 redds.

Risk Assessment for Holland and Lindbergh Lakes

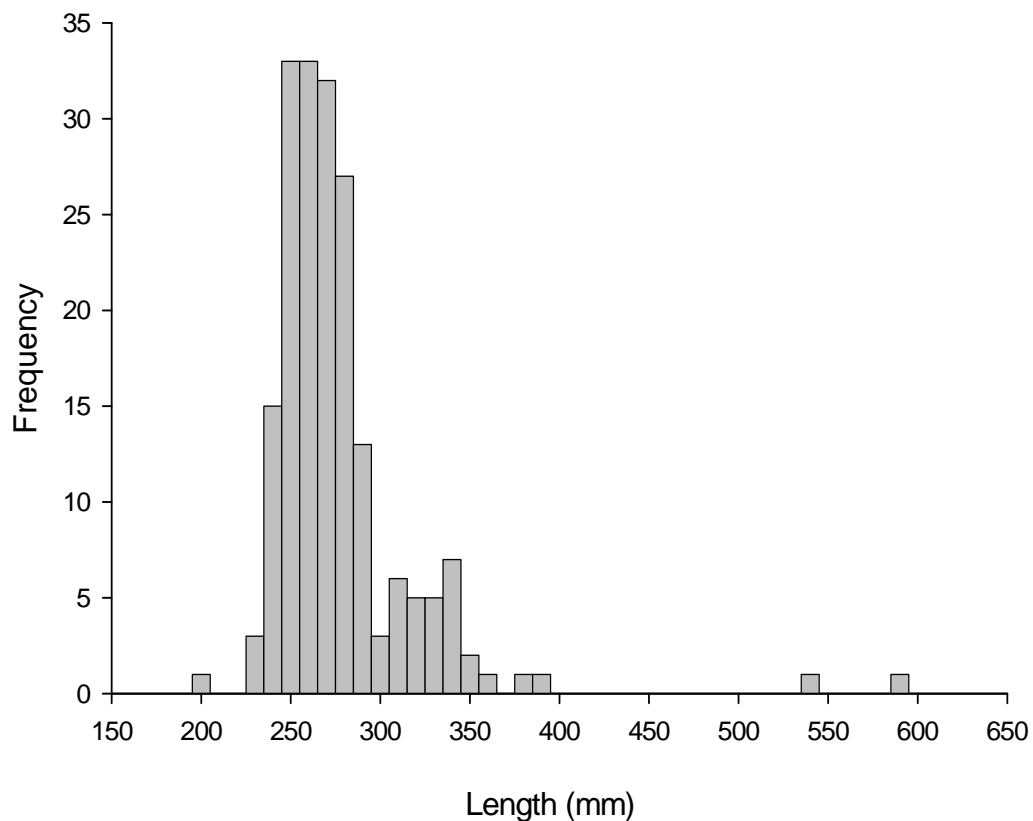
The SVBTWG is concerned about the vulnerability of Holland Lake and Lindbergh Lake to lake trout invasion. These lakes each host small, but important disjunct bull trout populations. There is no physical barrier to prevent Swan Lake fish from swimming upstream and colonizing either Holland or Lindbergh lakes. The SVBTWG conducted a risk assessment in 2005 and followed up with gill net surveys and redd counts (Holland only) in 2006.

- Annual redd counts from Holland Creek have declined since the 90's levels. Beaver dams in upper Holland Creek in recent years may have partially blocked upstream passage of adult bull trout into the upper portion of the spawning reach and in 2006 no redds were encountered above the uppermost dam.
- Spring gill netting conducted in Holland and Lindbergh Lakes in 2006 and before has not yet detected lake trout. Bull trout trends appear to be declining in Holland Lake and relatively stable in Lindbergh Lake. Additional data is available through MFWP.

Appendix A. Results of 2006 fall gill netting on Swan Lake (MSU Cooperative Fishery Research Unit data).

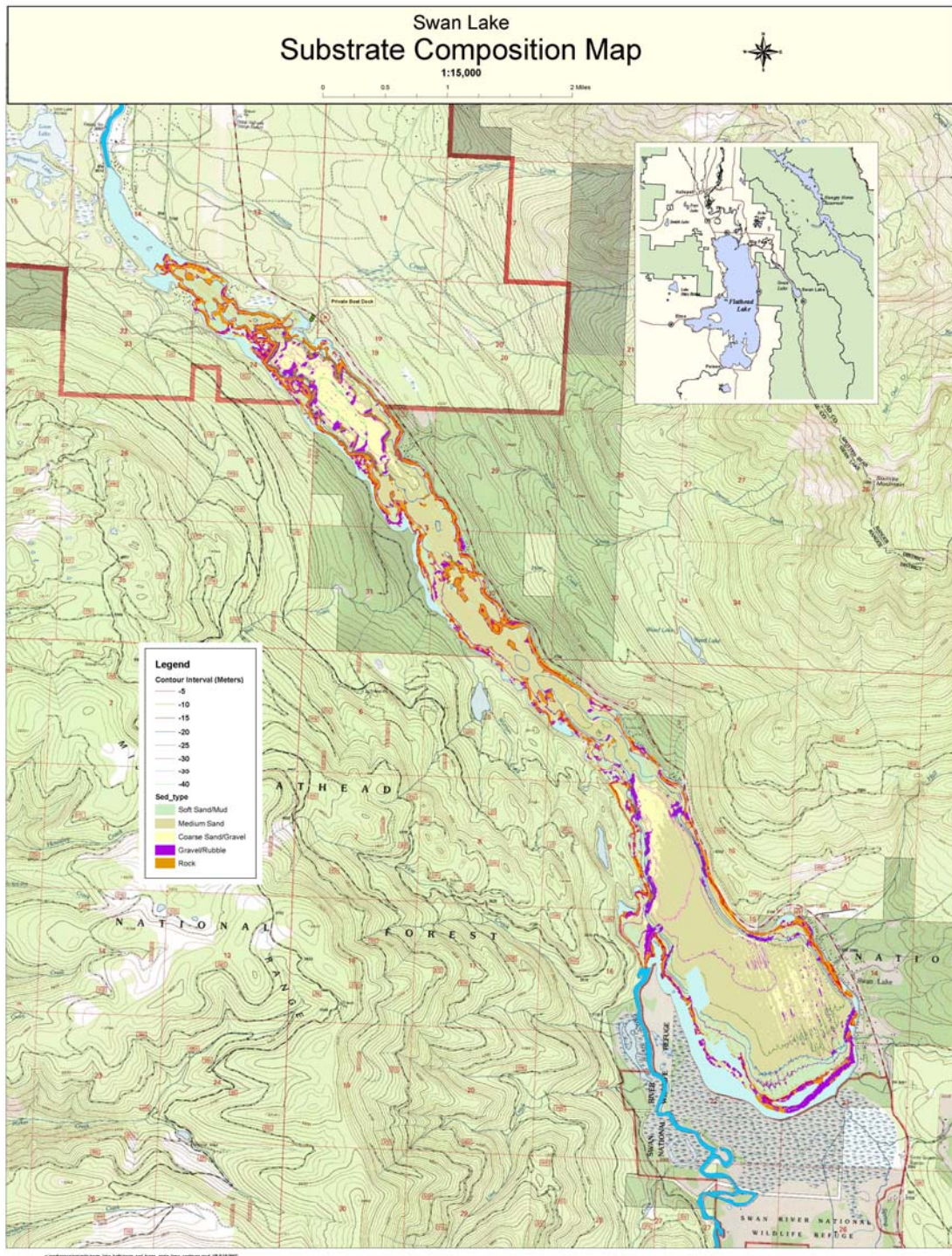
Week (Dates)	# of 1-Hour Net Sets*	Bull Trout Capture	Lake Trout Capture	Lake Trout Sonic Tagged	Lake Trout PIT Tagged
1 (9/20-23)	1	Approx. 12-14	1	0	1
2 (9/27-30)	7	23	77	2	21
3 (10/4-6)	4	29	35	3	26
4 (10/11-13)	6	12	19	1	13
5 (10/18-20)	6	25	14	0	9
6 (10/25-27)	4	7	48	0	31
Running Totals	28	110	194	6	101

*1 set = 3 250' uniform 1 in. Bar Mesh Gillnets



Length Frequency Histogram for Swan Lake lake trout (1cm bins), 2006

Appendix B. Draft of Swan Lake Substrate and Bathymetric Map



Appendix C. Early results of Swan Valley Bull Trout Hybridization Research. Abstract of presentation to the Montana Chapter American Fisheries Society, Missoula, MT, 2007.

Photo Documentation of Bull Trout and Brook Trout Hybridization.

Wade Fredenberg
U.S. Fish and Wildlife Service

Previous field survey and genetic sampling of fish in Goat and Lion Creeks, two tributaries of the Swan River in northwest Montana, had indicated a relatively high incidence of hybridization between bull trout *Salvelinus confluentus* and brook trout *Salvelinus fontinalis*. In 2006, I used an easily-constructed Plexiglas streamside solarium and a digital camera to individually photograph each of 336 *Salvelinus* specimens that were randomly captured by electrofishing crews at five sites in the two drainages. Finclip samples from each fish were analyzed, using a set of 13 microsatellite loci previously identified as being useful to distinguish between bull trout, brook trout, and hybrid individuals. Preliminary results of the genetic analysis determined that about 53% of sampled fish were bull trout, 38% were brook trout, and 9% were hybrids. Field identification matched closely with these proportions and well-trained observers adequately identified hybrid specimens. However, nine field misidentifications that were detected by genetic analysis were correlated to hybrids; some due to inability to recognize larger fish (>200 mm) as hybrids, and several due to smaller brook trout (<100 mm) that were improperly identified as hybrids. Additional evaluation of the genetic attributes of hybrid individuals will determine more about individual ancestry and spatial and temporal patterns of hybridization. The unique archive of broadside digital photos, most of which provide good or excellent representation of phenotypic characteristics, will allow us to use “visual virtual recall” to reexamine phenotypic characters of each fish (such as coloration and spotting patterns) and may be useful as future training aids.



Electrofishing to capture *Salvelinus spp.* in Goat Creek.



Fish processing during Lion Creek population assessment and hybridization evaluation.



Examples of brook trout (top), brook trout X bull trout hybrid (center), and bull trout (bottom) collected from Swan River tributary streams during 2006. All fish were photo-documented and genetically sampled for verification.