2009

Yankee Fork Salmon River Chinook Salmon Run Report

Kurt Tardy and Lytle Denny

Shoshone-Bannock Tribes

2009 Yankee Fork Salmon River Chinook Salmon Run Report

Annual Report

Prepared by:

Kurt A. Tardy and Lytle P. Denny

Shoshone-Bannock Tribes
Fish and Wildlife Department
3rd and B Avenue
Fort Hall, Idaho
(208) 239-4562

Prepared for:

United States Fish and Wildlife Service
Lower Snake River Compensation Plan – Office
1387 S. Vinnell Way, Suite 343
Boise, Idaho 83709

Cooperative Agreement 141109J015

August 2010

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABSTRACT

The Shoshone-Bannock Tribes initiated a Chinook salmon (*Oncorhynchus tshawytscha*) supplementation project in Yankee Fork Salmon River, Idaho to assist in returning 2,000 adults for Tribal conservation (1,500) and harvest (500) management objectives. In 2009, natural and hatchery Chinook salmon were expected to return to Yankee Fork in potentially adequate numbers to initiate broodstock collection for the supplementation project. The Tribes installed a temporary picket weir near Pole Flat Campground on June 30, nine days earlier than 2008; a modified trap box was attached to the weir. Overall, 49 Chinook salmon were trapped in 2009, of which 59.2% were natural and 40.8% were hatchery. Natural adults were released above the weir for natural spawning. A secondary weir was installed near Five Mile Creek on July 1 for broodstock collection and hatchery adult outplanting activities. Hatchery adults trapped at Pole Flat Weir were outplanted above Five Mile Weir to prevent migration into West Fork Yankee Fork where there is an ongoing supplementation study. In addition, 1,517 hatchery adults were obtained from Sawtooth Fish Hatchery and outplanted in upper Yankee Fork for natural spawning beginning July 14 and commencing on September 4. Intensive spawning ground surveys were completed from August 18 – September 10 and 414 redds were observed. Using mark-recapture techniques we estimated an additional 2 natural adults passed the Pole Flat Weir undetected. We observed 35 redds below Pole Flat Weir and 376 above. By expanding redd counts (n=35) below Pole Flat Weir by the adjusted fish per redd ratio (Peterson Addition) observed above (2.05) and ratio of hatchery and natural carcasses recovered below, we estimated 28 natural and 44 hatchery adults spawned below the Pole Flat Weir. In summary, we estimate 123 Chinook salmon returned to the Yankee Fork, of which 59 were natural and 64 were hatchery and 1,517 Sawtooth Fish Hatchery adults were outplanted. A total of 1,640 adult Chinook salmon were present in the Yankee Fork. Due to high escapement levels of hatchery adult Chinook salmon in 2009, broodstock collection did not occur in the Yankee Fork as originally planned, but did occur at Sawtooth. In addition, the Tribes installed a rotary screw trap in the Yankee Fork in 2009 to estimate juvenile migrants from program operations. We estimate a total of 534,024 (SE 17,348) natural x natural, hatchery x hatchery, and/or natural x hatchery juveniles migrating passed the screw trap from July 3 through November 13, 2009.

Authors:

Kurt A. Tardy
Anadromous Fish Biologist

Lytle P. Denny
Anadromous Fish Manager

ACKNOWLEDGEMENTS

The Shoshone-Bannock Tribes (Tribes) provided the administrative framework for this project to be successful. We especially thank Carlos Lopez for his engineering and welding skills, which were used to reconstruct the trap box structures. We would like to thank all the Tribal employees for their assistance in project operations including Carlos Lopez, Scott Brandt, Willie Hicks, Daniel Running-Eagle, Cory Bradley, Keno Coby, Paul Dann, Tyron Bronco, Kermit Bacon, Phelan Wadsworth, Theresa Tsosie, Andy Kohler, Duane Dupris, Angelo Teton, and Hal Hayball. We are especially thankful to Scott Marshall, Chris Starr, Steve Yundt and the Lower Snake River Compensation Plan (LSRCP) – Office for providing funding and support for this project; Idaho Department of Fish and Game (IDFG) personnel including Sharon Keifer, Bill Horton, Dave Venditti, Pete Hassemer, Sam Sharr, Tom Rogers, Brent Snider and the employees at Sawtooth Fish Hatchery (Sawtooth).

INTRODUCTION

The Yankee Fork Salmon River (Yankee Fork) is a traditional Chinook salmon fishery area for Shoshone-Bannock Tribal members, reserved under the Fort Bridger Treaty of 1868. Tribal fishermen have witnessed a significant decline in the number of fish being harvested in the Yankee Fork and this declined has been closely linked to the decline in productivity. One obvious candidate to explain the decline in productivity is the number of dams that smolts (juvenile downstream migrants) and returning adults must pass to survive and complete their life cycle (Schaller et al. 1999; Deriso et al. 2001).

Yankee Fork is one of nine independent populations of Chinook salmon located within the upper Salmon River major population group (MPG) (ICTRT 2007). Yankee Fork historically supported large runs of Chinook salmon (Reiser and Ramey 1987), however in 1992, they were listed as threatened under the Endangered Species Act (ESA) (57 FR14653). In 1995, there were no redds observed during the Tribes annual spawning ground surveys.

In response to the declining Chinook salmon population in Yankee Fork, the Tribes developed the Yankee Fork Chinook Salmon Supplementation (YFCSS) Project to increase the number of Chinook salmon returning to Yankee Fork. The decision to supplement Yankee Fork Chinook salmon resulted from a number of factors including: (1) an immediate need to prevent local extirpation; (2) the importance of the area as a Tribal subsistence fishery and the need to achieve the Tribal harvest objective of 500 adults; (3) the importance of recovering this population and achieving the conservation objective of 1,500 spawners annually; (4) the long history of introductions of out-of-basin stocks; (5) the proximity of a donor hatchery that could provide broodstock (i.e., Sawtooth) to support a supplementation effort; and (6) regional support for the enhancement effort.

Background

The YFCSS Project was developed to assist in returning 2,000 adult Chinook salmon to Yankee Fork for Tribal conservation (1,500) and harvest (500) management objectives. The first juvenile smolt release occurred in April 2006. Juveniles were 100% adipose fin clipped and expected to return as age^{5} adults in 2009.

In 2008, natural and hatchery Chinook salmon were expected to return to Yankee Fork in sufficient numbers to initiate broodstock collection for the supplementation project. Overall, 228 Chinook salmon were trapped, of which 18.9% were natural and 81.1% were hatchery (Denny and Tardy 2010). The first Chinook salmon was trapped on July 9, indicating the Chinook salmon run was already in progress; the last fish was trapped on September 17. Approximately 1,438 hatchery adults were obtained from Sawtooth and outplanted in upper Yankee Fork for natural spawning beginning July 30 and commencing on September 4. Intensive spawning ground surveys were completed from August 28 – September 19 and approximately 660 redds were observed. In summary, we estimate 497 Chinook salmon returned to the Yankee Fork, of which 88 were natural and 409 were hatchery and 1,438 Sawtooth hatchery adults were outplanted.

The Tribes developed a Memorandum of Agreement (Appendix A) between IDFG and LSRCP to authorize the YFCSS activities in 2009. The Tribes planned to operate two portable picket weirs to trap and collect returning adult Chinook salmon for broodstock to produce 200,000 to 400,000 smolts. If excess adults were identified at Sawtooth, YFCSS broodstock could be collected there and any remaining adults would be outplanted. No more than 1,500 adult were planned for outplanting in 2009.

The pre-season forecasted return of hatchery-origin Chinook salmon to Sawtooth was estimated to be 4,220 adults. This return was expected to be comprised of 4,015 age^{4} Sawtooth fish from BY05 and 205 age^{5} Sawtooth fish from BY04. This translated to an expected smolt-to-adult return rate (SAR) of 0.0014 for BY04 returns.

YFCSS assumed the same SAR for BY04 smolts released in the Yankee Fork, resulting in an expected 20 age^{5} adults. We estimated an additional 82 natural-origin adults would return (25 year average redd count expansion estimate assuming 2.5 spawners/redd; Matthews and Waples 1991), for a total escapement of 102 adults. These estimates provided the basis for broodstock collection plans as outlined in the MOA.

As part of the YFCSS monitoring and evaluation objectives, the Tribes installed a rotary screw trap in Yankee Fork anticipating capturing BY08 parr and pre-smolts migrating to the ocean. The rotary screw trap was donated by IDFG in 2009. Staff planned to enumerate, tag, and tissue sample juveniles migrating from the Yankee Fork.

This report covers the methods and results from the YFCSS Project activities in 2009.

Program Goal and Objectives

The number of adult Chinook salmon returning to the Yankee Fork to spawn is the basis for determining whether management actions are successful. Through a combination of management activities, including habitat restoration, harvest management, and hatchery supplementation the Tribes are working to achieve the long-term goal of returning 2,000 adult Chinook salmon to the Yankee Fork. The goal will provide 1,500 adults to utilize spawning and rearing habitats and 500 adults for harvest opportunities.

Until the Chinook salmon population is self-sustaining, the YFCSS Project will supplement the annual return of Chinook salmon to achieve the long-term adult abundance goal. In addition, the Tribes will continue to manage harvest according to the Tribal Resource Management Plan (Denny et al. 2008).

Study Area

Yankee Fork is located in the Salmon–Challis National Forest near Stanley, Idaho (Figure 1). The Yankee Fork flows through narrow canyons and moderately wide valleys with forest of lodgepole pine (*Pinus contorta*) (Richards and Cernera 1989). The Yankee Fork flows 41.8 kilometers (km) from north to south and enters the upper Salmon River at river rkm 590.6. The Yankee Fork headwaters originate at an elevation of 2,500 m and the watershed enters the upper Salmon River at an elevation of 1,880 m. The drainage is composed of 313.8 km^2 and includes Yankee Fork proper, West Fork Yankee Fork (largest tributary), followed by other notable tributaries including Ramey, Cearly, Lightning, Cabin, Jordan, Five Mile, Greylock, and Eight Mile creeks. Average precipitation is roughly 68.6 cm, base flows are approximately 1.13 cubic meters per second (m^3s), and mean flows are 6.99 m^3s. Most of the system is characterized by highly erosive sandy and clay-loam soils.

Gold was discovered in the area in the 1800s, 1930s, and 1950s which prompted human settlements and as such mining has become part of the rich history in Yankee Fork. Mining activities resulted in the complete re-channeling of lower portions of the Yankee Fork from Jordan Creek to Pole Flat Campground and the deposition of extensive unconsolidated dredge piles. The dredged portion of the Yankee Fork floodplain is sparsely vegetated with long sections containing riparian habitat only near the channel.

Most of the Yankee Fork watershed remains in excellent condition for the production of fish. Within the entire drainage, the number of redds have ranged from over 600 in 1960's, to less than 10 in the 1980's (Konopacky et al. 1986), to zero in the 1995.

Chinook salmon destined to the Yankee Fork enter the Columbia River during March through May, with spawning occurring in August and September (Bjornn 1960). Chinook salmon are exceptionally large fish, found to be comprised of primarily age^4 to age^5 adults having fork lengths exceeding 81 cm (Bjornn et al. 1964). Egg incubation extends into December, with emergence occurring in February or March (Reiser and Ramey 1987). Juveniles rear in freshwater until the spring (March-April) of their second year, prior to migrating to the ocean generally at a length of 10-13 cm (Bjornn 1960).

The majority of juveniles leave Yankee Fork as fry, parr, and pre-smolt with a smaller percentage leaving as smolts.

Other fish species present in the Yankee Fork include bull trout (*Salvelinus confluentus*), westslope cutthroat trout (*O. clarki lewisi*), steelhead (*O. mykiss*), mountain whitefish (*Prosopium williamsoni*), shorthead sculpin (*Cottus confuses*), and mountain sucker (*Catostomus platyrhynchus*) (Richards and Cernera 1989; Denny and Tardy 2007).

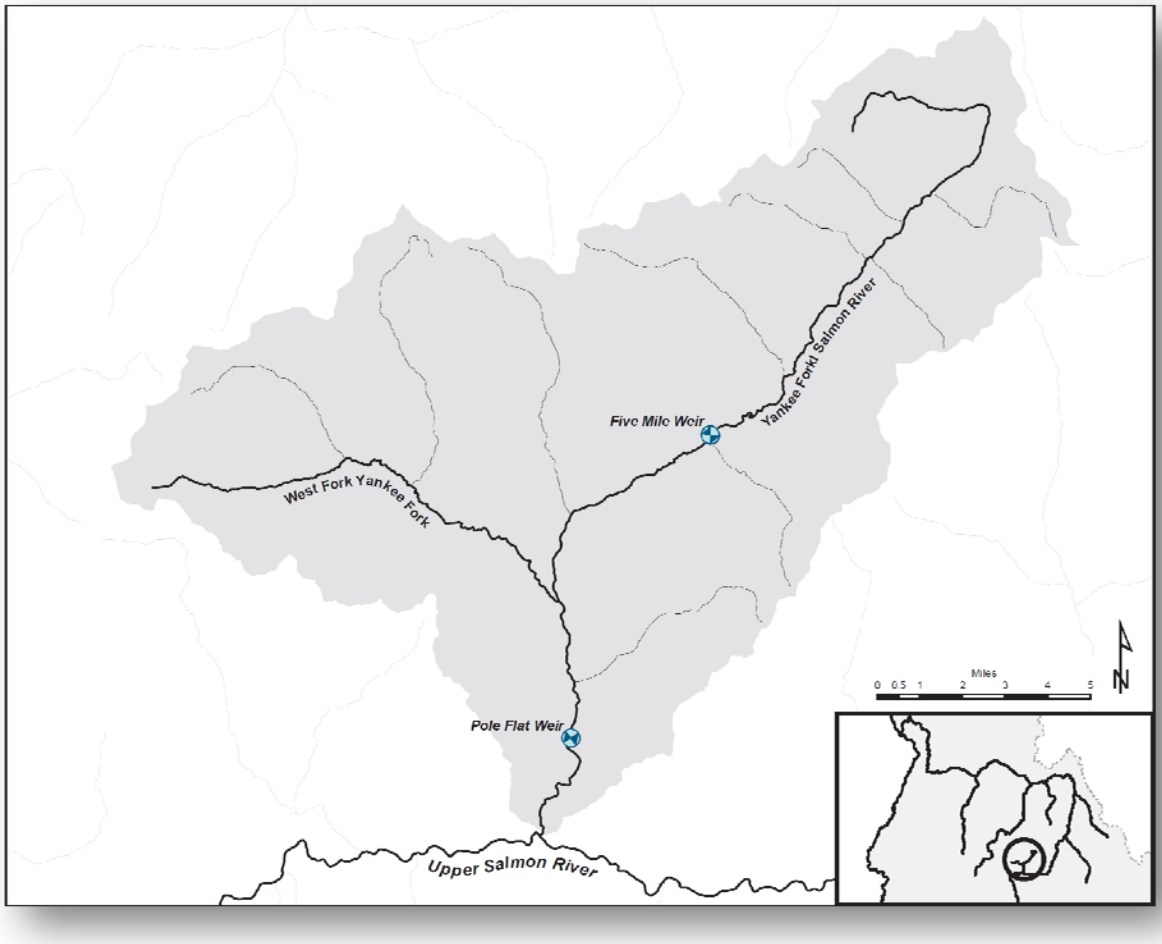


Figure 1. Map of Yankee Fork Salmon River, Idaho.

METHODS

Picket Weirs

The Tribes installed two portable picket weirs in the Yankee Fork in 2009 (Figure 1) for the purposes of enumerating the natural and hatchery return, collecting broodstock, and obtaining information for research, monitoring, and evaluation. The Pole Flat Weir was installed on June 30 near Pole Flat Campground approximately 5.2 rkm upstream from the confluence with the Salmon River (Figure 1). The Five Mile Weir was installed on July 1 near Five Mile Creek at rkm 21.5. Both weirs were located within the Salmon–

Challis National Forest, and authorized under a U.S. Department of Agriculture Forest Service Temporary Special – Use Permit YFK75.

Pole Flat Weir was installed as soon as flows were considered safe for installation (approximately 67.96 m^3s in the mainstem Salmon River below Yankee Fork). The Pole Flat Weir is a temporary structure consisting of v-shaped wings and an in-stream trap box (Figure 2). The v-shaped wings prevent upstream passage and funnel adult Chinook salmon towards the trap box structure. The v-shaped wings are sealed with 0.6 cm black plastic mesh attached to the pickets, which prevents adults from jumping through the pickets. We used 4.5 kg sandbags to seal the upstream side of the weir and trap box to prevent adults from getting through or under the pickets. The left wing of the weir consists of four tripods and four counter weights supporting two 3.0 m × 0.6 m panels with 120 – 3.0 m × 1.9 cm pickets. The right wing of the weir consists of nine tripods and eight counter weights supporting five 3.0 m × 0.6 m panels and 300 – 3.0 m × 1.9 cm pickets.

Figure 2. Pole Flat Weir.

During the winter of 2008-09, Tribal staff constructed a new trap box to accommodate for larger Chinook salmon returns in the near future. The trap box consists of four panels and has a dimension of 3.0 m × 3.0 m × 1.8 m (Figure 3). The panels of the trap box were picketed with 248 – 3.0 m × 1.9 cm pickets. The trap box was operated without two pickets in the entry way to allow a 12.7 cm passage way. Upon adult sorting, two pickets were installed to prevent adults from escaping. A recovery box measuring 3.0 m × 1.2 m × 1.8 m was constructed and attached to the trap box. The box was operated without two pickets on the upstream end to allow a 12.7 cm passage way for natural fish to freely

migrate upstream after adequate recovery time. A workstation with all necessary fish processing equipment was constructed on top of the trap box (Figure 3).

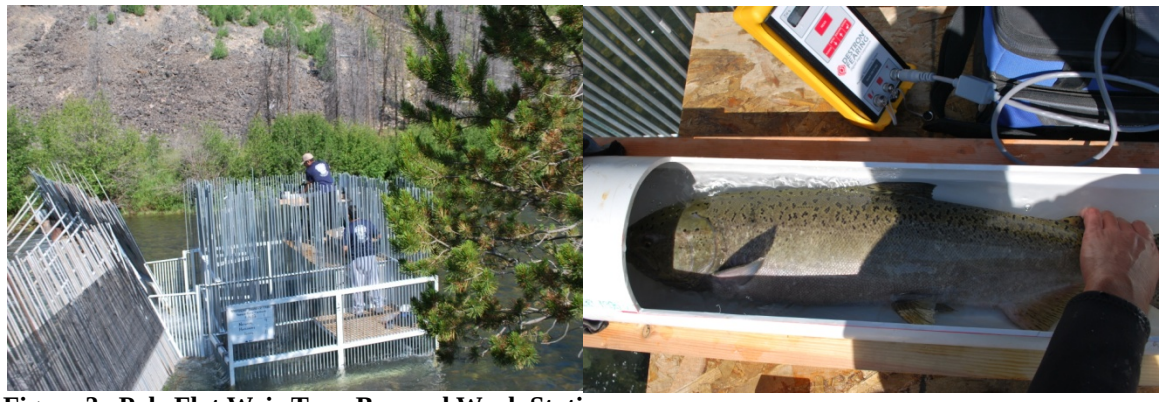


Figure 3. Pole Flat Weir Trap Box and Work Station.

Five Mile Weir is a temporary structure consisting of v-shaped wings and an in-stream trap box (Figure 4). The final 2008 Pole Flat trap box was utilized for the 2009 Five Mile structure. The right wing consists of four tripods and four counter weights supporting two 3.0 m × 0.6 m panels and 120 – 3.0 m × 1.9 cm pickets. The left wing consists of two tripods and two counter weights supporting a single 3.0 m × 0.6 m panel and 60 – 3.0 m × 1.9 cm pickets. The trap box consists of six panels and has a dimension of 3.0 m × 2.4 m × 1.2 m (Figure 4). The panels on the downstream side of the trap box were picketed with 134 – 1.5 m × 1.9 cm pickets, while the panels on the upstream side were made with steel cage to create a flow vortex. The trap box was operated without two pickets in the entry way to allow a 12.7 cm passage way. Upon adult sorting, two pickets were installed to prevent adults from escaping. Under normal trapping operations, the trap box was covered by two pieces of 2.4 m × 1.2 m × 1.9 cm plywood to prevent adults from jumping out. The weir wings and trap box were sealed with 4.5 kg sandbags and 0.6 cm black mesh. The Five Mile Weir was used to trap adult Chinook salmon but further served as a blocking device to prevent outplanted hatchery adults from straying into the West Fork Yankee Fork.

Figure 4. Five Mile Weir and Trap Box.

Adult Trapping

On a daily basis, both weirs were checked for newly trapped adult Chinook salmon and non-target species. All Chinook salmon were individually netted and transferred to a 136.4 liter modified Rubbermaid® tote holding freshwater. Fish were not anesthetized prior to handling because the Tribes were actively conducting a Chinook salmon fishery and the preferred anesthetics are not FDA approved for human consumption. Adult Chinook salmon were visually examined for fin clips, operculum punches, external tags, and injuries as well as scanned for PIT and CWT tags. The following biological data was collected: origin, fork length (cm), scale, and genetic sample (0.5 cm^2). Chinook salmon were marked with a right operculum punch for genetic sample and mark-recapture analysis. Each fish was visually inspected for key phenotypic characteristics (i.e., kipe jaw, vent) to determine gender.

Natural Chinook salmon were released directly above the weir for natural spawning. Hatchery adult Chinook salmon were transported and outplanted above Five Mile Weir for natural spawning. Hatchery adults outplanted for natural spawning were not injected with erythromycin.

All hatchery adults were individually loaded and transported using a modified fish tank mounted on a ¾ ton pick-up truck. The fish tank has one 1363.8 liter compartment and is supplied with pure oxygen through a stone diffuser. A circulating pump is powered by the ¾ ton pick-up truck to increase oxygenation. The fish tank was filled with water

pumped directly from Yankee Fork with a two horsepower pump. IHOT guidelines were followed for transporting adult fish, which is approximately 0.45 kg of fish per 4.5 liters of water.
In the event of a mortality, staff recorded detailed information on the carcasses following normal trapping procedures described above, including the cause of death. Carcasses were distributed near the Pole Flat Weir for nutrient enrichment and the caudal fin was removed to prevent duplicate counting.

Once all fish were enumerated, the weir structures were cleaned and checked to ensure proper function. Staff snorkeled and/or walked the upstream and downstream sides of the weirs to ensure the structures were sealed and functioning properly. If mortalities were found while cleaning the weir, staff followed normal procedures described above.

Screw Trap

The Tribes installed a rotary screw trap in the Yankee Fork in 2009 (Figure 4) for the purposes of enumerating, tagging, and genetic tissue sampling migrating juveniles for research, monitoring, and evaluation. The screw trap was installed on July 2 downstream of Pole Flat Campground approximately 5.0 rkm upstream from the confluence with the Salmon River. The trap was located within the Salmon–Challis National Forest, and authorized under a U.S. Department of Agriculture Forest Service Temporary Special – Use Permit YFK66.

The screw trap was installed after construction of the Pole Flat and Five Mile weirs. The screw trap is a temporary structure consisting of two floating pontoons, a rotating cylindrical corkscrew cone, and a live box (Figure 5). Five centimeter braided wire cable attached to each pontoon islet was connected to a pulley hook on the main cable spanning approximately 20 m across the river allowing the trap to operate in the channel thalweg. Due to low flows later in the season, the trap was relocated on August 19, downstream above the canyon confluence at approximately 4.8 rkm upstream from the confluence with the Salmon River.

On a daily basis, after checking both weirs for newly trapped adult Chinook salmon and non-target species, the live box on the screw trap was emptied at approximately 11:00 into one large cooler; evident non-target species were enumerated, recorded, and released directly downstream of the trap. Temperature and staff gauge measurements were recorded prior to transporting fish and additional coolers to the working station.

Juveniles ≤ 69 mm were stained using Bismark Brown (1.8 L to 18.2 L water) for a minimum of 20 minutes and maximum of 40 minutes. Juveniles ≥ 70 mm were injected with a Passive Integrated Transponder Tag (PIT tag) after being anesthetized in a clove oil solution. Daily, a maximum of 25 individuals per size criteria were marked. All marked fish were measured to the nearest 1 mm, weighed to the nearest 0.01 g, and tissue sampled. Stained and PIT tagged juveniles were released upstream of the trap at Maternity Hole for mark-recapture analysis to obtain trap efficiency. Recaptures and remaining fish by species were enumerated, recorded, and released downstream of the trap near Pole Camp Creek. Mortalities were recorded as either the result of trapping or

handling. If the mortality was a PIT tagged individual, the tag was recollected prior to disposing of the mortality downstream of the trap.

Figure 5. Rotary Screw Trap.

Adult Outplanting

As mentioned above, hatchery Chinook salmon trapped at Pole Flat or Five Mile weirs were either scheduled for broodstock collection or natural spawning. Hatchery fish scheduled for natural spawning were outplanted in the upper Yankee Fork at rkm 22.6, 25.1, and 31.5 (Figure 5). Hatchery Chinook salmon were directly transported to upper Yankee Fork in the fish tank during the early morning or late evening/night (only on large trapping days) to reduce stress and mortality.

In addition to outplanting hatchery fish returning to Yankee Fork, the Tribes reached agreement with IDFG to outplant hatchery adults collected at Sawtooth in excess of broodstock needs. IDFG requested a proposal from the Tribes to determine an appropriate number of adults for outplanting. Prior to outplanting Sawtooth adults, the Tribes' Fish and Game Commission curtailed Tribal hunting for Chinook salmon in the upper Yankee Fork to maximize production benefits and prevent Tribal members from harvesting and consuming fish injected with erythromycin or formalin bath treatments.

Sawtooth adults were transported in tanks mounted on three ¾ ton pick-up trucks and one LSRCP tanker truck. On outplanting days, hatchery fish were crowded in the West Pond at Sawtooth following normal protocols and individually netted out. The following biological data was collected from each outplant: fish identification #, gender, length (cm), genetic sample (0.5 cm^2), and vial #. Each fish was individually loaded into one of the truck tanks listed above and transported directly to Yankee Fork. Sawtooth hatchery fish were outplanted in the upper Yankee Fork at rkm 22.6, 25.1, and 31.5 (Figure 5) and Eight Mile Creek at rkm 2.0. Adult fish were either released using nets or funnel tubes (for large tanker truck). In the event of mortality, the caudal fin was removed to prevent duplicate counting during spawning ground surveys.

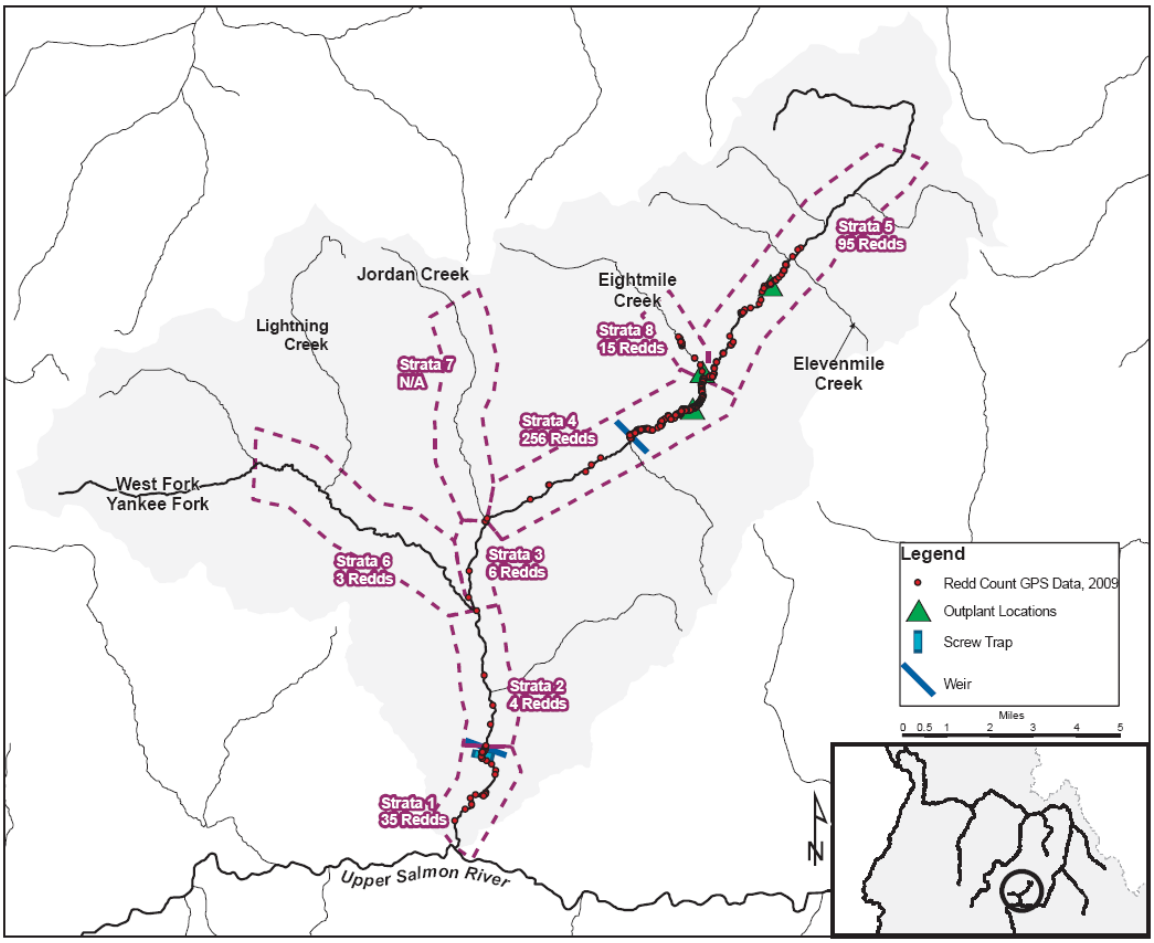


Figure 6. Weirs, screw trap, adult outplanting and redd locations in Yankee Fork, Idaho, 2009

Spawning Ground Surveys

Intensive spawning ground surveys were conducted in Yankee Fork and its major tributary, West Fork Yankee Fork to determine spawn timing, redd enumeration and distribution, abundance of live fish and to collect carcasses for biological information. Spawning ground survey procedures were developed by the YFCSS Project for hatchery effectiveness monitoring and coordinated with the various programs and/or agencies conducting field work in the Yankee Fork.

Tribal efforts were derived from three separate Fish and Wildlife Department projects including: 1) YFCSS, 2) Salmon River Habitat Enhancement (SRHE), and 3) Idaho Supplementation Studies (ISS). IDFG efforts were derived from project staff working under the Captive Rearing Initiative for Salmon River Chinook Salmon. Yankee Fork was sub-divided into eight distinct stratum (Konapacky 1986), (Figure 6). On a weekly basis, observers walked Yankee Fork (Strata 1–5, 8) during mid-day marking Chinook salmon redds and recovering carcasses; SRHE staff participated with our efforts within these strata on two occurrences. ISS staff conducted bi-weekly surveys (3 total passes) in Stratum 6, West Fork from Lightning Creek to Cabin Creek, while IDFG staff conducted surveys 2 – 3 times per week covering the section of Stratum 6, from the confluence with

Yankee Fork to Lightning Creek. Eightmile Creek (Stratum 8) was added and Stratum 7 (Jordan Creek) was not surveyed.

Observers were provided standard gear (i.e., polarized sunglasses, data sheets, gps unit, ribbon, permanent markers, backpack, and genetic sampling kit) and covered the same area over a four week period to increase the accuracy and precision of data collected. Chinook salmon redds were identified, recorded, and marked with an iridescent ribbon directly lateral to the apex of the redd. Observers recorded the following information on the ribbon: date, agency, observer initials, redd number and this information was linked to the data sheets, scales envelopes, genetic vials, fin ray envelopes, and otolith envelopes.

Carcasses encountered during the surveys were examined for fin clips, operculum punches, and external tags following standard trapping protocols. We identified three categories for processing carcasses: (1) operculum punched, (2) not operculum punched, and (3) natural-origin. If the carcass showed a pre-existing operculum punch, staff recorded gender, origin, fork length (cm), and percent spawned. If the carcass was not marked with a pre-existing operculum punch, the following biological data was collected: gender, origin, fork length (cm), percent spawned, scale sample, and genetic tissue sample (0.5 cm^2). If the carcass was a naturally produced Chinook salmon, biological data was collected as prescribed under categories one or two, with the addition of a fin ray and otolith sample, as requested by IDFG. The caudal fin was removed from all sampled carcasses and the carcass was placed back in the stream for nutrient enrichment.

RESULTS

Adult Trapping

Pole Flat and Five Mile weirs were installed on June 30 and July 1, respectively. The first Chinook salmon was trapped at Pole Flat Weir on July 5, six days after installation and the last fish was trapped on September 8. The Tribes operated Pole Flat Weir for 73 days and Five Mile Weir for 79 days. Pole Flat and Five Mile weirs were removed on September 15 and September 22, respectively.

A total of 49 Chinook salmon were trapped, of which 29 were natural (59.2%) and 20 were hatchery (40.8%) (Table 1). The sex ratio for natural fish was skewed towards males where as the ratio was skewed towards females for hatchery fish. The overall male: female ratio of all returning fish was similar.

Table 1. Adult Chinook salmon trapping summary for Yankee Fork Salmon River.

	Natural			Hatchery			Total		
Year	Males	Females	Total	Males	Females	Total	Males	Females	Total
2008	28	15	43	90	95	185	118	110	228
Percent	65.1%	34.9%	18.9%	48.6%	51.4%	81.1%	51.8%	48.2%	
2009	16	13	29	9	11	20	25	24	49
Percent	55.2%	44.8%	59.2%	45.0%	55.0%	40.8%	51.0%	49.0%	

The Tribes and IDFG agreed that hatchery returns to Sawtooth were sufficient to meet Sawtooth and YFCSS Project broodstock goals, which were established at 1.3 million and 400,000 Chinook salmon smolts, respectively. Therefore, no broodstock was collected in Yankee Fork and all hatchery adults were transported and outplanted above Five Mile Weir for natural spawning. There were two total mortalities, both natural-origin jacks, gilled in the pickets of the Pole Flat Weir.

Three natural fish were captured at the Five Mile Weir, one male and two females, all recaptures. These were released above for natural spawning.

Non-Target Species

Bull trout individuals were the only non-target species captured at the weir during the eleven weeks of trapping. Bull trout were lengthed, tissue sampled for IDFG analysis, and released immediately above the weir. There were a total of 18 individuals (Table 2) with an average length of 48.5 cm. Six individuals (in yellow) were recorded as mortalities. Bull trout captures, mortalities, and metrics have been appropriately reported to Scott Grunder, IDFG Native Species Coordinator. Both 2008 and 2009 bull trout genetic tissue samples were shipped to Tom Curet, Salmon Region Fish Supervisor. All other non-target species including mountain whitefish, rainbow trout, and cutthroat trout were small enough to freely pass between the pickets in the weir or trap box.

Table 2. Date and length of incidentally trapped bull trout in the Yankee Fork, 2009.

Date	Gender	Length (cm)	Disposition
1-Jul	NA	24	Released
2-Jul	NA	28	Mortality
6-Jul	NA	29	Released
11-Jul	NA	72	Released
11-Jul	F	44	Released
11-Jul	F	45	Released
12-Jul	M	49	Mortality
12-Jul	F	41	Mortality
29-Jul	F	56	Mortality
1-Aug	F	NA	Released
6-Aug	F	64	Mortality
20-Aug	NA	58	Released
21-Aug	NA	48	Released
26-Aug	M	53	Mortality
26-Aug	F	56	Released
31-Aug	F	53	Released
31-Aug	M	54	Released
31-Aug	F	52	Released

Run-Timing

Chinook salmon migration occurred over a 66 day period from July 5 – September 8 (Figure 7). Natural fish migration occurred over a 66 day period from July 5 – September 8. Of the 20 hatchery fish trapped (Table 1) migration occurred over a 58 day period from July 10 – September 5. Natural and hatchery Chinook salmon exhibited bi-modal run-timing distribution. The first peak occurred during mid July and the second peak occurred during late September, with the majority of fish being trapped during the second peak. Daily trapping frequency was highest on three days, July 11, August 15, and August 21, with each day four total fish being trapped.

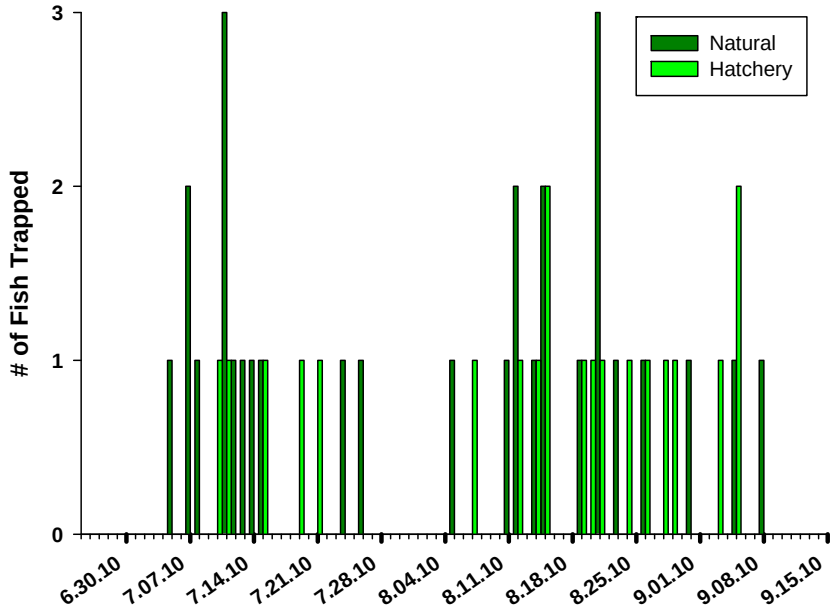


Figure 7. Daily trapping frequency of natural and hatchery Chinook salmon adults.

The return timing of natural and hatchery fish was similar with 50% of the adults enumerated on August 11 and 15, respectively (Figure 8). After 50% of the return entered Yankee Fork, the remaining components of both runs entered in a surprisingly rapid period of time, consistent with the 2008 return.

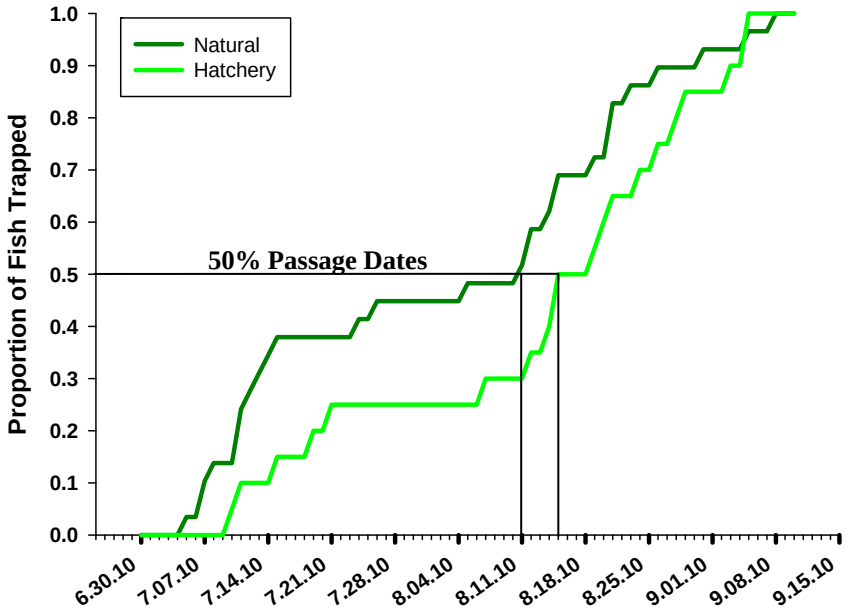


Figure 8. Run-timing of natural and hatchery Chinook salmon.

Age Structure

The Tribes used two methods to determine age structure of natural and hatchery fish returning to Yankee Fork, both based on fork length (cm). Age categories as defined by Copeland et al. (2008) were used to estimate age at return for natural fish (Table 3). The following length categories developed for use at Sawtooth were adopted for hatchery fish ($age^3 \leq 64$ cm $\geq age^4 \leq 82$ cm $\geq age^5$) returning to Yankee Fork. These methodologies will be utilized until we develop age structure categories for Yankee Fork.

Table 3. Age by length for adjusted natural size classes (Copeland et. al 2008).

Size Class	Age 3	Age 4	Age 5
50-59	0.93	0.07	0.00
60-69	0.20	0.80	0.00
70-79	0.00	0.96	0.04
80-89	0.00	0.25	0.75
90-99	0.00	0.02	0.98
100-109	0.00	0.00	1.00

Using the methodologies listed above, 47% of the fish trapped were age^4 adults, followed by 39% age^5, and 14% age^3 (Table 4, Figure 9). One age^3 and eight age^4 hatchery adults likely strayed into the Yankee Fork. From fish trapped at Pole Flat Weir approximately 11 were age^5 hatchery adults from the BY04 smolt release.

Of the natural fish trapped, six were considered age[3] adults, with 15 age[4] and eight age[5] adults (Table 4). There were fewer age[4] hatchery fish than natural fish and more age[5] hatchery fish than natural fish.

Table 4. Age composition of hatchery and natural Chinook salmon.

	Age[3]			Age[4]			Age[5]		
Year	Natural	Hatchery	Total	Natural	Hatchery	Total	Natural	Hatchery	Total
2008	1	4[1]	5	14	148	162	28	33[1]	61
Percent	20%	80%	2%	8%	92%	71%	46%	54%	27%
2009	6	1[1]	7	15	8[1]	23	8	11	19
Percent	85.7%	14.3%	14%	65.2%	35.8%	47%	42.1%	57.9%	39%

[1]/ hatchery strays.

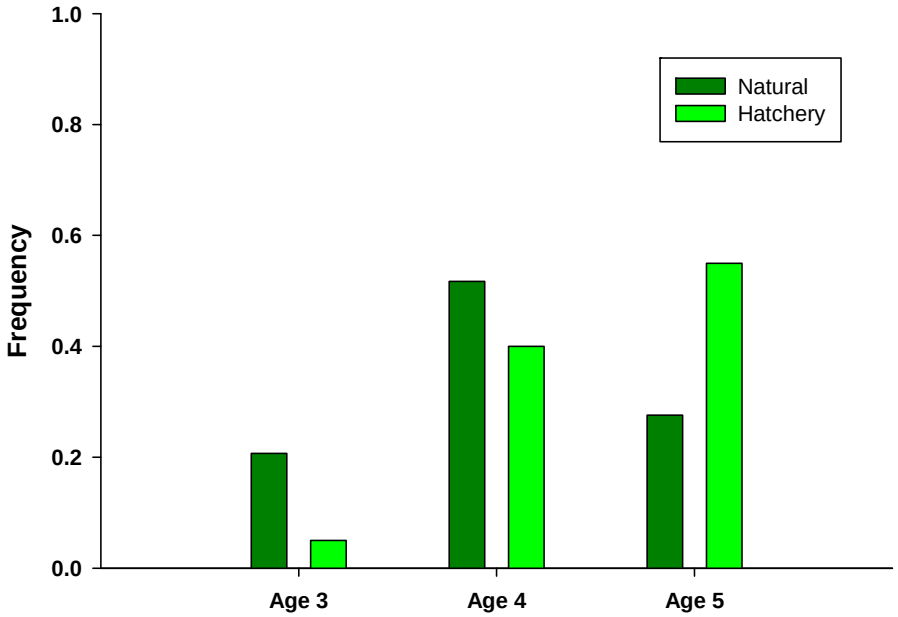


Figure 9. Age frequency of natural and hatchery Chinook salmon.

Of the fish trapped at Pole Flat Weir, fork length averaged 78.3 cm (range 47 – 103). Natural Chinook salmon ranged from 47 to 103 cm fork length with an average length of 74.8 cm, while hatchery Chinook salmon ranged from 58 to 100 cm fork length with an average length of 83.4 cm (Figure 10).

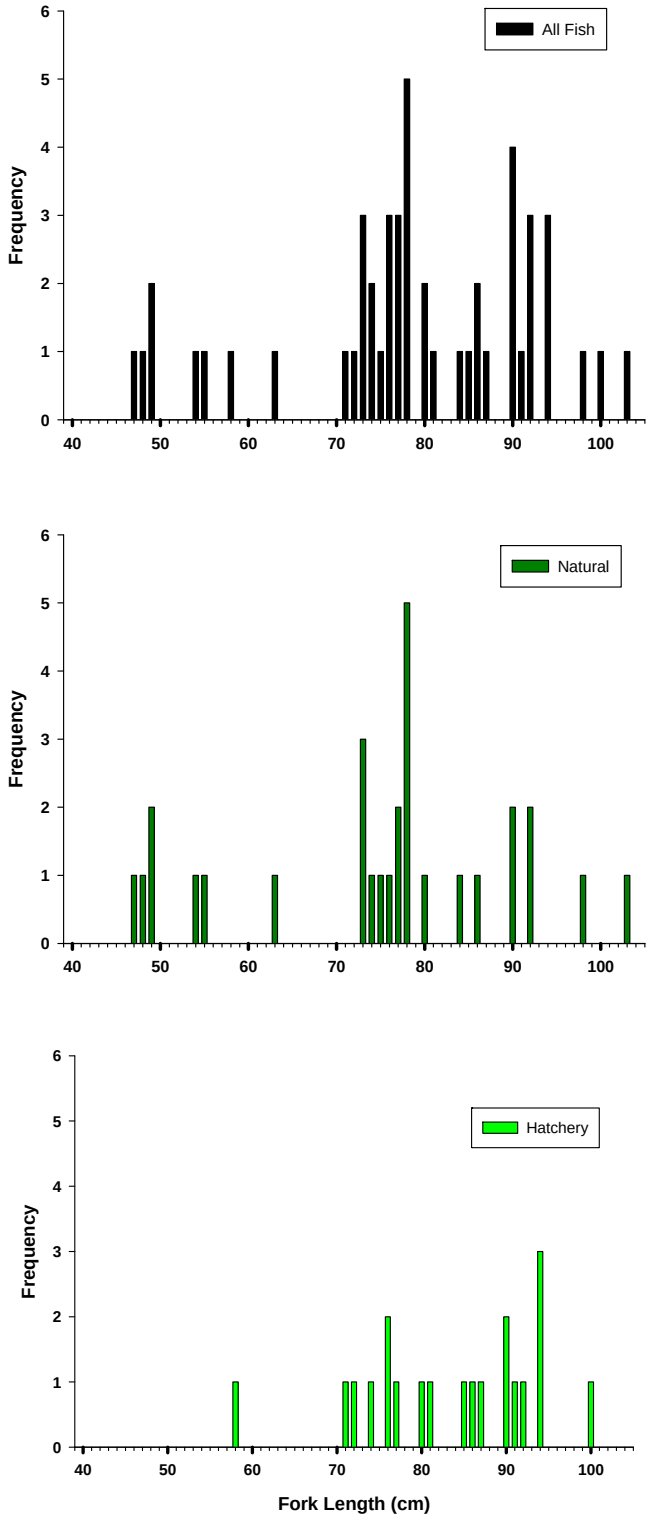


Figure 10. Length frequency of all fish, natural fish, and hatchery fish.

Juvenile Trapping

The Yankee Fork screw trap was installed on July 2 and operated for 133 days until removal on November 13. Staff trapped and handled a total of 54,292 juvenile individuals. Non-target species including bull trout (640), cutthroat trout (249), rainbow trout (25), and mountain whitefish (990) resulted in 1,904 captures. Steelhead trout, a focal species for the Streamside Incubator and Smolt Release Projects, enumerated as 5,206 captures. Staff marked 2,672 steelhead juveniles of which 2,155 were stained and 517 were PIT tagged. There were a total of 142 recaptures for an overall trap efficiency of 0.053 ± 0.004.

In 2009, there were 47,182 juvenile Chinook salmon captured in screw trap operations with 557 (1.2%) mortalities recorded. Staff marked a total of 12,227 juveniles (11,306 stained parr; 921 PIT tagged pre-smolt) and collected 497 genetic samples for parentage analysis under monitor and evaluation activities. There were a total of 949 recaptures for an overall trap efficiency of 0.078 ± 0.002.

Using the methods and data collected by the ISS, staff stratified time periods by juvenile life stage, significant changes in the hydrograph, and trap re-location to calculate a Gauss population estimate (Figure 11). Parr were stratified into three periods due to a significant change in the hydrograph and trap re-location on August 19. ISS has classified September 1 as the arbitrary date for the pre-smolt life stage and, therefore, a separate period.

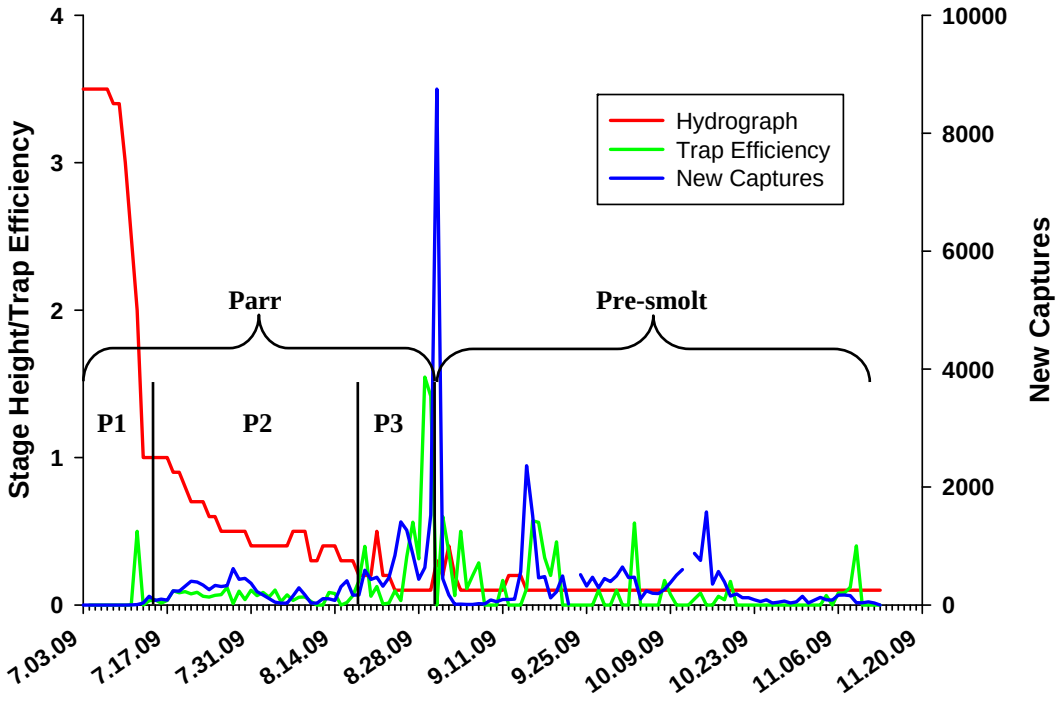


Figure 11. Yankee Fork hydrograph, screw trap efficiency, and migration timing of Chinook salmon juveniles from 2009 trapping operations.

In all, staff estimates 305,722 (SE 8,546) parr passed the screw trap between July 3 and August 31, 2009 and 228,252 (SE 20,670) pre-smolt from September 3 until trap removal on November 13, 2009. During the period of July 3 through November 13, 534,024 (SE 17,348) Chinook salmon juveniles were estimated to have migrated downstream past the screw trap. Due to late acquisition and installation of the screw trap, estimates for BY07 smolt migrants could not be calculated.

Adult Outplanting

Yankee Fork has an estimated spawning potential to accommodate 7,117 adult Chinook salmon. For adult outplanting activities in the upper Yankee Fork (Five Mile Creek to McKay Creek), we estimated the spawning area could sustain approximately 2,980 spawners (Table 5). This estimate was based on a habitat model, usable spawning habitat (length of stream and width), area of an average Chinook salmon redd, and 2.5 fish per redd. The Tribes requested to outplant 1,500 adults to seed ~50% of the spawning area carrying capacity estimate. Of the 1,500 adults scheduled for outplanting, approximately 40% were proposed to be females and 60% males, of which 5% of the males could be jacks. However, in 2009, due to timing and structure of the run, outplants were conducted as 50% males and females.

Table 5. Estimated Chinook salmon spawning area, redd numbers, and adult escapement estimate for the Yankee Fork Salmon River.

Yankee Fork Stream/ Segment	Length (Miles)	Length (Feet)	Measured Flow (cfs)	Habitat Model Used [a]	Estimated Total Spawning Area (ft^2)	Estimated Usable Area (ft^2) [b]	Estimated Number of Redds [c]	Estimated Adult [d]
Yankee Fork								
Mouth to Polecamp Creek	2.8	14784	45	YF-2 (adjusted)	24300	2430	61	91
Polecamp Creek to West Fork	4	21120	104	YF-4	111725	11172	279	419
West Fork to Jordan Creek	2.3	12144	50	YF-3	92662	9266	232	347
Jordan Creek to Fivemile Creek	4	21120	45	YF-2	43487	4349	109	163
Fivemile Creek to Ninemile Creek	5.3	27984	31	YF-1	153328	76664	1917	2875
Ninemile Creek to McKay Creek	4.5	23760	45	YF-2 (adjusted)	27896	2789	70	105
sub-total	22.9	120912			453398	106670	2667	4000
West Fork								
Mouth to Cabin Creek	8	42240	44	WF-1	299198	74799	1870	2805
Cabin Creek to Divide	4	21120	44	WF-1 (adjusted)	83289	8329	208	312
sub-total	12	63360			382487	83128	2078	3117
Total	34.9	184272			835885	189798	4745	7117

a Adjusted models applied to unmodeled reach - models adjusted for width and total area

b Areas adjusted by percentage of total spawning area thought usable in the reach, assuming redd aerial requirements must be contiguous

c Numbers derived from Chinook redd area estimate of 40 ft^2/redd

D Assumes 2.5 fish/redd or 1.5 males/female

Beginning July 14 and ending September 2, YFCSS and IDFG personnel transported and released 1,517 Sawtooth hatchery Chinook salmon (Table 6) above Five Mile Weir for natural spawning (Figure 5). Sawtooth adult outplants were marked with a left operculum punch for genetic evaluations and identification during spawning ground surveys. In total 750 males (49.4%) and 767 females (50.6%) were released to spawn naturally; this included 81 jacks.

Table 6. Sawtooth hatchery adult Chinook salmon outplanting summary.

Date	Trips	Males	Females	Total Chinook
7/14/2009	5	58	62	120
7/15/2009	5	80	140	220
7/17/2009	3	35	45	80
7/21/2009	4	36	54	90
7/22/2009	4	34	66	100
7/23/2009	8	104	85	189
7/24/2009	8	72	129	201
7/28/2009	2	36	19	55
7/29/2009	1	54	102	156
8/6/2009	1	13	12	25
8/7/2009	1	12	18	30
8/21/2009	1	48	2	50
8/26/2009	3	117	13	130
9/2/2009	2	51	20	71
Total	**48**	**750**	**767**	**1517**

Spawning Ground Surveys

Spawning ground surveys were conducted from August 18 – September 10. Four total passes were conducted in the seven identified strata by the same monitoring group to detect newly completed redds. Superimposition of redds within the outplanted area was minimal indicating that sufficient spawning habitat was available. There were 414 total redds (Table 7; Figure 12) identified.

Table 7. Number of redds observed by stratum and total in Yankee Fork, 2009.

Location	Redds Observed
Stratum 1	35
Stratum 2	4
Stratum 3	6
Stratum 4	256
Stratum 5	95
Stratum 6	3
Stratum 7	N/A
Stratum 8	15
Total	**414**

In stratum 1, most redds were recorded just below the weir in excellent spawning habitat created by a landslide from fire activity in previous years. Majority of the redds (366) were located in strata 4 and 5 (above the upper weir) obviously due to the large release of hatchery-origin adults from the YFCSS and SFH. Data suggests that natural production is low in strata 1, 2, and 3 from depressed natural adult returns and canyon/dredged habitat type not conducive to spawning.

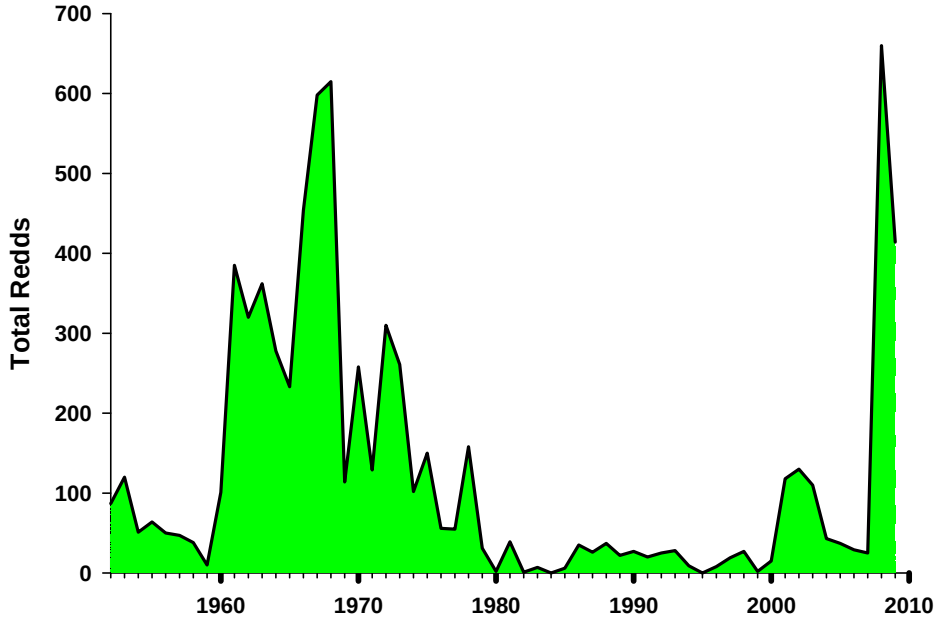


Figure 12. Chinook salmon redds in Yankee Fork, 1956 - 2009.

Mark-Recapture Evaluation

The Tribes acknowledge the presence of potential un-trapped returning adults in Yankee Fork. To determine the total escapement to Yankee Fork, the Tribes utilized a mark-recapture study to apply an efficiency rate to recovered unmarked adults to estimate a total number.

The mark-recapture study was conducted with natural-origin adults between the lower and upper weir. There were 27 natural adults released above Pole Flat Weir, of which 11 operculum punched adults were recovered in spawning ground surveys for an efficiency of 40.7%. Field crews recovered one natural and zero hatchery carcasses that were not operculum punched. Using the Peterson Estimator (Chapman 1951):

$$A\hat{A}W_{M/R} = [(M+1)\ (C+1)/R+1)] - 1$$

Where M is marked released above, C is total carcass recoveries including marked and unmarked, and R is marked carcass recoveries.

This results in a total of 31 estimated natural-origin adults above the weir with a variance of three fish. Since no unmarked hatchery carcasses were recovered above the weir, there is no expansion for hatchery returns past Pole Flat Weir. Overall trapping efficiency therefore equaled 93.5% (29/31).

Using an adjusted fish per redd value (Peterson Addition) obtained between the Pole Flat and Five Mile Weirs, the Tribes were able to estimate adult escapement below the Pole Flat Weir. To estimate this number, the Tribes applied the adjusted fish per redd value (2.05) to the 35 redds identified below the weir; resulting in 72 fish. Applying the ratio of natural (0.39) and hatchery (0.61) carcass recoveries below the weir, we estimate 28 natural and 44 hatchery adults spawned below the weir.

We estimate 28 natural adults spawned below the Pole Flat Weir and 31 escaped above for a total return of 59 natural-origin adults. We further estimate 44 hatchery adults spawned below Pole Flat Weir and 20 escaped above for a total return of 64 hatchery adults. Combining both origins, the Tribes estimate a total return of 123 adults to the Yankee Fork in 2009.

Total Escapement

Overall, we estimate 123 natural and hatchery adults returned to Yankee Fork in 2009 and an additional 1,517 Sawtooth hatchery adults were outplanted. Of the adults that returned naturally, 64 were hatchery (52.0%) and 59 were natural (48.0%). Yankee Fork natural fish were comprised of 26 males (44.1%) and 33 females (55.9%). Yankee Fork hatchery fish were comprised of 25 males (39.1%) and 39 females (60.9%). The total spawning aggregate comprised 1,640 adults with 1,581 hatchery (96.4%) and 59 natural (3.6%) creating 414 redds (Table 8).

Table 8. Yankee Fork production values 2006 – 2009.

Year	Releases	Trapped HOR	Trapped NOR	Est. Escapement	Redds Produced
2006	135,934 smolts				21
2007					18
2008	1,438 adults	185	43	1,935	660
2009	1,517	20	29	1,640	414

CITATIONS

Bjornn, T.C. 1960. The Salmon and Steelhead Stocks of Idaho. Idaho Department of Fish and Game.

Bjornn, T.C., D.W. Ortmann, D. Corley, and W. Platts. 1964. Salmon and Steelhead Investigations. Idaho Department of Fish and Game. Federal Aid in Fish Restoration, Annual Progress Report, Project F-49-2-2.

Copeland, T., J. Johnson, and S. Putnam. 2008. Idaho Natural Production Monitoring and Evaluation. Annual Progress Report February 1, 2007-January 31, 2008. IDFG Report Number 08-08.

Denny, L. P., K. Witty, and S. Smith. 2006. A monitoring and evaluation plan for the Shoshone-Bannock Tribes: Hatchery supplementation activities Yankee Fork; Salmon River sub-basin. Draft Review Shoshone-Bannock Tribes, Department of Fisheries Resources Management.

Denny, L.P. and K.A. Tardy. 2007. Yankee Fork Chinook Salmon Supplementation Hatchery Genetics Management Plan. Prepared for NOAA-Fisheries. Fort Hall, Idaho.

Denny, L.P., K.A. Tardy, K.A. Kutchins, and S.E Brandt. 2008. Tribal Resource Management Plan For Shoshone-Bannock Tribes' Snake River Spring/Summer Chinook Salmon Fisheries within the Salmon River Sub-Basin. Shoshone-Bannock Tribes. Fort Hall, Idaho.

Deriso, R.B., Marmorek, D.R., and Parnell, I.J. 2001. Retrospective patterns of differential mortality and common year-effects experienced by spring and summer Chinook salmon (*Oncorhynchus tshawytscha*) of the Columbia River. Can. J. Fish. Aquat. Sci. 58: 2419-2430.

Heiberg, E.R. 1975. Lower Snake River Fish and Wildlife Compensation Plan, Washington and Idaho: Special Report. Department of the Army.

Interior Columbia Basin Technical Recovery Team. 2007. Viability Criteria for Application to Interior Columbia Basin Salmonid ESUs. March 2007.

Konopacky, R. C., P. J. Cernera, and E. C. Bowles. 1986. Salmon River Habitat Enhancement. Annual Report FY 1985, Part 1 or 4, Subproject III: Yankee Fork Salmon River. Shoshone-Bannock Tribes Report to Bonneville Power Administration.

NOAA Fisheries. 2007. Draft Federal Columbia River Power Systems Biological Opinion. Prepared for ESA Section 10 Permit and NWF v. NMFS, Civ. No. CV 01-640-RE (D. Oregon).

Pollard, H.A. 1985. Salmon and Spawning Ground Surveys. Federal Aid in Fish Restoration, Job Performance Report. Idaho Department of Fish and Game, Project F-73-R-7.

Reiser, D. W. and M. P. Ramey. 1987. Feasibility plan for the enhancement of the Yankee Fork of the Salmon River, Idaho. Prepared for the Shoshone-Bannock Tribes, Fort Hall, Idaho. BPA contract No. 83-359.

Richards, C. and P. J. Cernera. 1989. Dispersal and abundance of hatchery-reared and naturally spawned juvenile chinook salmon in an Idaho stream. North American Journal of Fisheries Management 9: 345-351.

Schaller, H.A., Petrosky, C.E., and Langness, O.P. 1999. Contrasting patterns of productivity and survival rates for stream-type Chinook salmon (*Oncorhynchus tshawystcha*) populations of the Snake and Columbia rivers. Can. J. Fish. Aquat. Sci. 56: 1031-1045.

Appendix A

Memorandum of Agreement

2009 Broodstock Management Plan for Sawtooth Hatchery & Yankee Fork

Introduction

The Shoshone-Bannock Tribes (SBT), Idaho Department of Fish and Game (IDFG), and Lower Snake River Compensation Plan (LSRCP) office plan to collect Chinook salmon (*Oncorhynchus tshawytscha*) in the Yankee Fork Salmon River (Yankee Fork) in 2009. This Memorandum of Agreement (MOA) describes broodstock collection and disposition, weir operations, and smolt production in 2009.

The court-approved 2008-2017 *United States vs. Oregon* (US v OR) Management Agreement identifies implementation of a Chinook program in Yankee Fork starting in 2009. Notwithstanding the US v Oregon agreement, nor prejudicing development of a long term plan, the expected return of hatchery-origin Chinook salmon to Sawtooth Fish Hatchery (Sawtooth) and Yankee Fork Salmon River in 2009 provides options that were not available in previous years.

Background

In 2006, 1.42 million BY '04 Sawtooth hatchery-origin Chinook salmon smolts were released on station and an additional 135,934 BY '04 smolts were released into Yankee Fork near Jordan Creek confluence (approximately 9 miles upstream from the mouth). In 2009, the pre-season forecasted return of hatchery-origin Chinook salmon to Sawtooth is 4,220 adults. This return is expected to be comprised of 4,015 four year old Sawtooth fish from BY'05 and 205 five year old Sawtooth fish from BY '04. This translates to an expected smolt-to-adult return rate (SAR) of 0.14% for BY'04 returns. If we assume the same SAR for BY'04 smolts released in the Yankee Fork as is forecasted for Sawtooth, we can expect about 20 five year old adults, with an additional 82 natural-origin adults (25 year average redd count expansion estimate assuming 2.5 spawners/redd; Matthews and Waples 1991), for total escapement of 102 adults in Yankee Fork.

On April 17, 2009, SBT, IDFG, and LSRCP met at the IDFG headquarters building in Boise, ID to facilitate discussion to develop a Broodstock Management Plan for Sawtooth and Yankee Fork. At that meeting, IDFG, SBT, and LSRCP identified three programs associated with the Chinook salmon production at Sawtooth and agreed to hatchery and harvest management actions to insure that implementation of each program is consistent with LSRCP goals, US v OR management objectives, and recommendations of the United States Fish and Wildlife Service (USFWS) Hatchery Review Team (HRT) as well as the Congressionally-established Hatchery Scientific Review Group (HSRG). It was

further agreed that implementation of the three programs should not adversely affect the completion of the ongoing Idaho Supplementation Studies (ISS) programs in the Upper Salmon River and Yankee Fork. Additionally, all parties agreed that the upper limit for smolt rearing at Sawtooth given the existing raceway space, water availability and winter icing conditions is **1.7 million** smolts. The basic programs and associated operations and management guidelines are as follows:

1. **Mitigation**
   a. The primary mitigation goal is to replace lost harvest opportunity.
   b. A minimum annual on-site release of **1.3 million** smolts is the target for the mitigation program.
   c. The current segregated broodstock for the mitigation complies with HSRG guidance.
   d. All smolts released for mitigation will be ad-clipped and broodstock for the mitigation program will be collected among returns of ad-clipped adults to Sawtooth.
2. **Upper Salmon River Supplementation**
   a. The goal of this supplementation program is to conserve and rebuild natural-origin spawning populations in the Upper Salmon River.
   b. The program is consistent with goals outlined in the US v OR management agreement.
   c. The program can be managed consistent with an integrated broodstock program as recommended by the HSRG.
   d. Collection of natural-origin broodstock at Sawtooth might negatively impact the existing ISS hatchery evaluation research project in 2009, but not in 2010.
      i. Natural spawning that occurs between the Sawtooth Weir and Redfish Lake Creek is not included in the ISS study design. Broodstock could be collected for the integrated broodstock program in 2009 by pumping eggs deposited naturally in redds between the Sawtooth Weir and Redfish Lake Creek.
   e. The smolt release target for this supplementation program is **200,000** smolts.
3. **Yankee Fork Chinook Salmon Supplementation Program**
   a. The goal of this supplementation program is to conserve and rebuild natural-origin spawning populations in the Yankee Fork.
   b. The goal is consistent with goals outlined in the US v OR management agreement.
   c. Although the HSRG did not make specific recommendations relative to a supplementation program in the Yankee Fork, the program can be managed consistent with an integrated broodstock program as described by the HSRG for the Upper Salmon River.
   d. Broodstock collection for this integrated program should be prioritized in 2009 as follows:
      i. Returns of hatchery-origin ad-clipped five year old adults from the BY ‘04 smolt releases in Yankee Fork (either weir).

ii. Natural origin (un-clipped) adult returns to the Five Mile weir.
iii. If the broodstock goal cannot be met with the aforementioned returns to the Yankee Fork, ad-clipped adult returns to the Sawtooth weir will be used to make up the shortfall.

e. The smolt release target for this supplementation program is **200,000** smolts. Parties acknowledge that Tribal program smolts will receive coded-wire tags (CWT) prior to release; costs associated with tagging (wire, programmatic) of Tribal smolts will be addressed *prior* to the marking of BY '09 progeny at Sawtooth (~ September 2010).

The SBT, IDFG, and LSRCP recognize that these are long term goals and that the supplementation programs described are in the building phase of development. Specific facility operations and fisheries management actions during the next three to five years will likely need to be described annually as progress is made towards long term goals. The three parties agreed to the following additional guidelines specific to 2009:

1) In 2009, the SBT will operate two weirs (lower/upper) in the Yankee Fork drainage. The lower weir will be located at Pole Flat Campground (approximately 3.5 miles upstream of confluence with the Salmon River) and the upper weir will be located just above Five Mile Creek on main Yankee Fork (Figure 1). Pole Flat weir will be operated to: a) trap first generation Sawtooth hatchery-origin Chinook salmon returning from the BY '04 smolt release in lower Yankee Fork; b) transport those hatchery-origin Chinook salmon to the East Fork Salmon River satellite facility for potential broodstock; and c) trap and pass all natural-origin Chinook salmon (see section 3.d.ii. above) and all other species. Five Mile weir will be operated to: a) trap and enumerate Chinook salmon that escape into the upper Yankee Fork; b) collect natural-origin Chinook salmon for broodstock and transport to East Fork satellite facility for potential broodstock; c) trap and pass all other species. Disposition of Yankee Fork collected Chinook is discussed below (Broodstock Collection).
2) Signatories below acknowledge this agreement serves as a mechanism to provide ESA take coverage under IDFG's Section 6 bull trout (*Salvelinus confluentus*) agreement as well as the Section 10(a)(1)(A), Scientific Research Permit 1127 – 3R issued to the SBT.
3) NOAA and USFWS consultation, and acquisition of USFS special use and IDFG fish collection and fish transportation permits must be completed by the SBT prior to installation and operation of the weir and transportation of adult Chinook.

Broodstock Collection

Returns of hatchery-origin Chinook salmon to the Upper Salmon River will be managed in 2009 to achieve LSRCP mitigation production at Sawtooth while at the same time implementing supplementation programs for the Yankee Fork and Upper Salmon River programs as described above.

Recognizing that pre-season forecasts are subject to a high degree of uncertainty, the Parties will contact each other weekly to discuss progress towards achieving the broodstock target goals identified above.

The primary goal of the Chinook salmon program at Sawtooth is to mitigate for lost harvest opportunity. The segregated hatchery program for harvest mitigation is consistent with HSRG recommendations. Adipose fin-clipped hatchery-origin adults returning to the hatchery weir are used for broodstock to produce a minimum annual release target of **1.3 million** adipose fin clipped smolts.

To achieve the **1.3 million** smolt goal at Sawtooth, approximately 350 females and 350 males will be spawned (n = 700) to achieve 1.5 million green eggs (4,300 eggs/female; average of 88% eyed egg-to-smolt survival).

If sufficient adults return to Yankee Fork weirs to produce **200,000** smolts, all eggs will be taken from Yankee Fork Chinook Salmon Supplementation Program (YFCSS) returns. Sawtooth Hatchery-origin adults, above and beyond the **1.3 million** harvest mitigation, will provide a contingency back-up plan to provide eggs to produce up to **200,000** smolts if that objective cannot be met with fish returning to the Yankee Fork. If insufficient numbers of adults spawn below the Sawtooth weir, thereby limiting the collection of eggs for Upper Salmon River Supplementation, excess production space at Sawtooth may be utilized to produce more than **200,000** smolts for the YFCSS. Broodyear 2009 Chinook releases in the Yankee Fork will occur according to the Yankee Fork HGMP distribution schedule (to be developed and agreed to by all parties), but will generally conform to the production values listed above (**200,000** smolt minimum reared at Sawtooth).

To achieve the **200,000** smolt goal for the YFCSS, approximately 55 females and 55 males will be spawned (n = 110) to achieve 236,500 green eggs (4,300 eggs/female; average of 88% eyed egg-to-smolt survival). As necessary, Sawtooth hatchery-origin ad-clipped adults may be used to provide additional broodstock, as necessary, up to the total YFCSS adult return to accommodate **200,000** smolts.

In order to address genetic diversity and sibling relatedness concerns in age-5 hatchery-origin adults to the Yankee Fork, spawn matrices for the YFCS brood should be prioritized as follows:

Natural-Origin Yankee Fork Females

1. YF Natural-origin females ***X*** YF natural-origin males
2. YF Natural-origin females ***X*** age-5 hatchery-origin males
3. YF Natural-origin females ***X*** Sawtooth hatchery-origin males (any)

Age-5 Hatchery-Origin Yankee Fork Females

1. Age-5 hatchery-origin females ***X*** YF natural-origin males
2. Age-5 hatchery-origin females ***X*** Sawtooth hatchery-origin males (any)

3. Age-5 hatchery-origin females ***X*** age-5 hatchery-origin males (***least desirable cross***)

Trap Operations

In 2008, the Pole Flat weir trapped 64.6% of the returning Chinook salmon entering Yankee Fork. Because of high water, the Pole Flat weir was installed on July 9 and the first fish was captured later that day, indicating the run was already in progress. The Pole Flat weir was operated through September 25. The Five Mile weir was installed on July 27 (prior to release of any hatchery-origin Chinook salmon) and removed on October 8, after spawning was complete.

In 2009, the LSRCP provided funding to the SBT to modify and update both weirs. The modifications will improve the SBT's ability to collect and safely handle adult Chinook salmon and allow the SBT to install the Five Mile weir earlier in the season, most likely in early July.

Depending upon spring runoff conditions, trapping operations in 2009 will begin between mid-June and continue through early September. The Pole Flat weir will be removed after seven consecutive days of no fish being trapped. The Five Mile weir will be removed once spawning is completed in the upper Yankee Fork. Shoshone-Bannock staff will be present 24 hours a day to trap, transfer, monitor, and evaluate adults collected at the weirs. All natural-origin adults collected at the Pole Flat weir will be immediately passed above with minimal handling; natural-origin adults captured at the Five Mile weir may be transported to adult holding facilities on the East Fork for broodstock purposes and/or released with minimal handling. All mortalities will be examined and data will be collected on date, time, sex, cause of death (if known), and body condition.

Adult Chinook salmon will be transported by the SBT using a 300 gallon tank mounted on a truck to the East Fork satellite facility for holding. The tank has one compartment of 300 gallon capacity and is modified to include oxygen (tank and diffuser) and circulating pump. The tank will be filled with water pumped directly from Yankee Fork on a daily basis. Normal hauling guidelines will be followed for adult fish, which is approximately one pound of fish per gallon of water.

Adult holding ponds at East Fork will be checked on a daily basis by trap tenders. Mortalities will be removed and data will be collected on date, time, sex, cause of death (if known), and body condition. Biological samples will be collected and placed in proper containers for later analysis.

Adult Outplanting

Should enough adults return to Sawtooth to achieve the target egg take (**1.3 million** smolts LSRCP mitigation, up to **200,000** YFCSS contingency), ad-clipped Sawtooth adults in excess of programmatic brood needs may be transferred to the SBT and released

in the Yankee Fork for natural spawning. Tentative release scenarios include releases of up to 1,500 adults to include:

- 1,500 adults total; approximately 750 pair male/female
- Sex/age breakdown approximately 40% female, 60% male (~55% adult + ~5% jack returns)

Additionally, adults in excess of the brood needs (above) may be provided to the SBT for Ceremonial and Subsistence distribution and/or made available to charitable organizations for food distribution.

Critical Habitat

The NMFS published a final rule designating critical habitat for Snake River spring/summer Chinook salmon October 25, 1999. Both weirs will be constructed in ESA listed critical habitat located in Yankee Fork. The SBT weir operations is not likely to adversely impact critical habitat, since it is a temporary structure that will be removed in the fall.

Fish Health

The SBT and IDFG will follow fish health practices as proposed by Integrated Hatchery Operations Team (IHOT) recommendations (IHOT 1995). Brood fish trapped at Yankee Fork will be examined for pathogens during routine collection; subsequent handling of trapped adults at the East Fork (EF) holding ponds will be minimized to the extent possible. Adults will be monitored daily at EF holding ponds for excessive external mycosis and parasites; severe mycotic and/or parasitic pathogen loads will be addressed through consultations with IDFG Fish Health Pathologists. Adults trapped in 2009 will not be injected with erythromycin.

General Monitor and Evaluation

As part of the long-term monitoring and evaluation (M&E) program, the SBT are prepared to assess the success of hatchery supplementation activities in the Yankee Fork. All Yankee Fork trapped adult Chinook salmon, both natural and hatchery will be sampled for genetic analysis and ***right operculum*** punched. Hatchery-origin adult outplants from Sawtooth, if available, will be genetically sampled and marked with a ***left operculum*** punch. Operculum punch will be used in a mark recapture analysis. Scale samples will be obtained for age and life history determination as a contingency to tissue samples. All samples will be stored in 95% ethanol for later analysis.

The SBT will conduct creel surveys using Pacific Coastal Salmon Recovery Fund (PCSRF) to estimate total Chinook and bull trout harvest in Yankee Fork. Tribal staff will obtain tissue samples, fork length, gender, CWT, or PIT tag information from harvested Chinook. Tribal fisherman will be provided with scale envelopes to preserve scales from harvest fish not surveyed and sampled. Total fish harvest, pressure, and CPUE will be estimated yearly.

Under the LSRCP funded Supplementation, Monitoring, and Evaluation Program (SMEP), the SBT will conduct intensive spawning ground surveys in the Yankee Fork and operate a rotary screw trap near the confluence with Yankee Fork. The Salmon River Habitat Enhancement Project and SBT/IDFG Idaho Supplementation Studies Projects will also conduct intensive spawning ground surveys in the West Fork Yankee Fork, conduct snorkel surveys to continue the long-term parr trend dataset, and assess habitat enhancement actions.

The SBT will provide a detailed report of the YFCSS program by December 31, 2009 to the LSRCP, IDFG, USFS, and NOAA-Fisheries as part of the FY-2009 SMEP Annual Report.

Reservation of Rights

The Parties recognize that each Party reserves all rights, powers, and remedies now or hereafter existing in law or in equity, by statute, treaty, or otherwise. Nothing in this Agreement is or shall be construed to be a waiver of the sovereignty of the SBT, the State of Idaho and its agencies (including IDFG), or the United States and its agencies (including the United States Fish and Wildlife Service and the LSRCP). By entering into this Agreement, the Parties reserve, and do not waive, jurisdictional claims relating to the regulation of anadromous fish production or any other matter. The Agreement instead is intended solely to facilitate intergovernmental cooperation among the Parties and does not create any right in the Parties or other persons to seek administrative or judicial enforcement of provisions herein. No Party shall use this Agreement for the purpose of advancing any such jurisdictional claim.

Citations

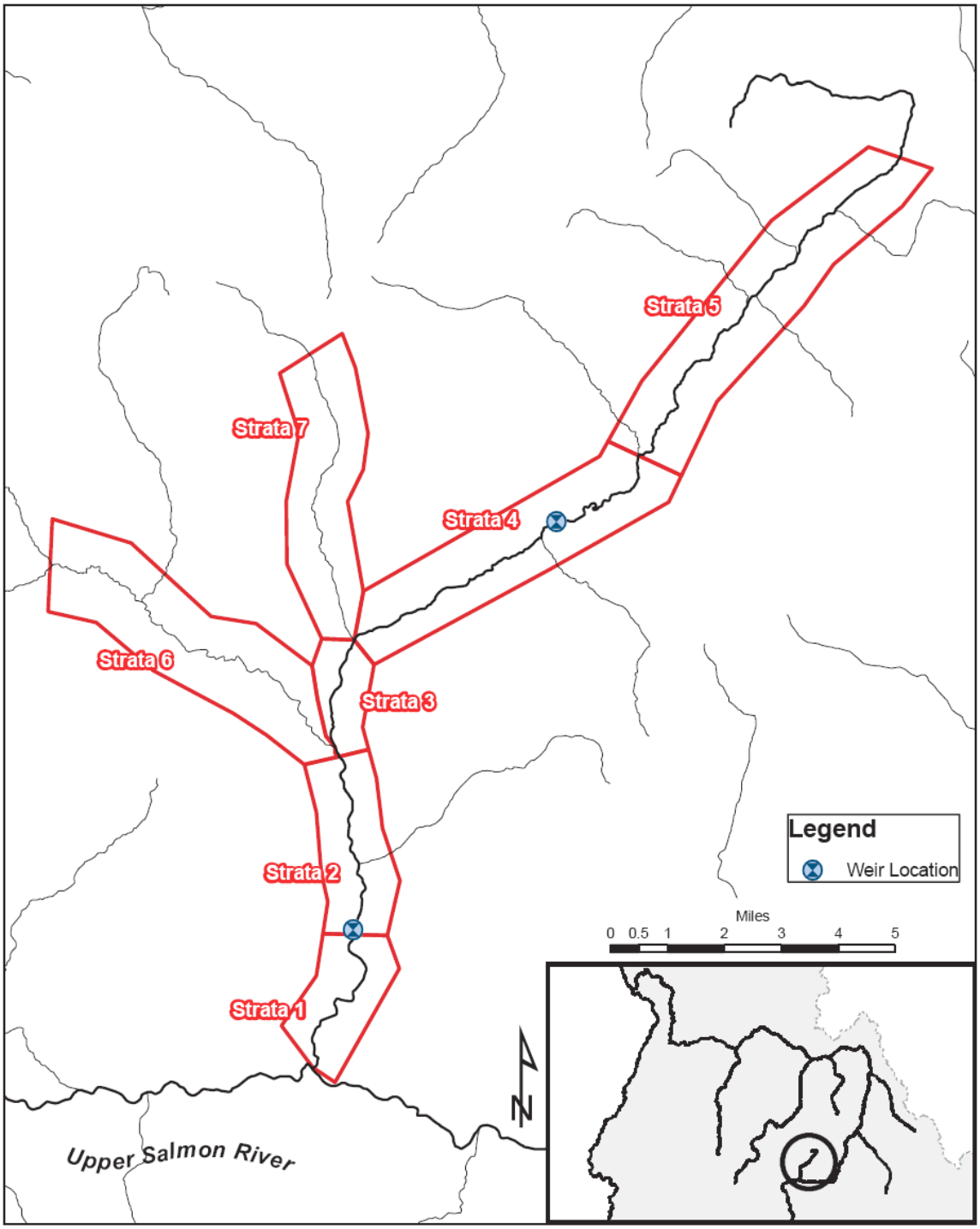
IHOT (Integrated Hatchery Operations Team). 1995. Policies and procedures for Columbia basin anadromous salmonid hatcheries. Annual Report 1994. BPA, Portland, Oregon. Project No. 92-043, January 1995. 115 p.

Matthews, G. M., and R. S. Waples. 1991. Status review for Snake River spring and summer chinook salmon. U.S. Dep. Commer., NOAA Tech. Memo. NMFS F/NWC-200, 75 p.

Authorization

Signatories below indicate support for the 2009 broodstock management plan for Sawtooth Hatchery and Yankee Fork Salmon River.

_____	_____	_____
Cal Groen Director, IDFG	Scott Marshall Administrator, LSRCP	Alonzo Coby Chairman, Shoshone-Bannock Tribes



Locations of the two portable picket weirs in Yankee Fork Salmon River, Idaho.