2010

Yankee Fork Salmon River Chinook Salmon Run Report

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Shoshone-Bannock Tribes
February 23, 2011

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Annual Report

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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 and harvest management objectives. In 2010, natural-origin Chinook salmon and hatchery strays were expected to return to Yankee Fork in potentially adequate numbers to initiate broodstock collection for the supplementation project. Prior to initiating trapping operations, Idaho Department of Fish and Game and Tribal staff released 398,444 BY08 smolts in Yankee Fork on April 20, 21, and 23, 2010. The Tribes installed a temporary picket weir near Pole Flat Campground on July 9, nine days later than 2009; a modified trap box was attached to the weir. Overall, 18 Chinook salmon were trapped in 2010, all of which were natural-origin. Natural-origin adults were released above the weir for natural spawning. A secondary weir was installed near Five Mile Creek on July 11 for broodstock collection and hatchery adult outplanting activities. Due to low returns to the upper Salmon River, no hatchery adult strays were trapped or obtained from Sawtooth Fish Hatchery in 2010. Intensive spawning ground surveys were completed from August 18 – September 1 and 27 redds were observed. Using mark-recapture techniques we estimated an additional 32 natural-origin adults and 3 jacks passed the Pole Flat Weir undetected. We observed five redds below Pole Flat Weir and 22 above. By expanding redd counts (n=5) below Pole Flat Weir by the fish per redd ratio observed above (2.41), we estimated 12 natural-origin adults spawned below the Pole Flat Weir. In summary, we estimate 65 natural-origin Chinook salmon returned to the Yankee Fork. Due to no escapement of hatchery adult Chinook salmon and low natural returns in 2010, broodstock collection did not occur either in the Yankee Fork or at Sawtooth as originally planned. In addition, the Tribes installed a rotary screw trap in the Yankee Fork in 2010 to estimate juvenile emigrants from project operations. We estimate a total of 129,733 (SE 5,619) natural x natural, hatchery x hatchery, and/or natural x hatchery juveniles emigrated passed the rotary screw trap from April 27 to June 2 and August 21 through November 16, 2010.

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INTRODUCTIONS

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 decline 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 emigrants) 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; (3) the importance of recovering this population and achieving the conservation objective; (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 and harvest management objectives. The first hatchery-origin juvenile smolt release occurred in April 2006. Hatchery-origin juveniles were 100% adipose fin clipped and expected to return as age^{4} adults in 2008 and age^{5} adults in 2009. There were no juveniles available for release in 2007 – 09.

In 2008 and 2009, natural and hatchery-origin Chinook salmon were expected to return to Yankee Fork in sufficient numbers to initiate broodstock collection for the supplementation project. Overall, 277 Chinook salmon were trapped, of which 25.9% were natural and 74.1% were hatchery (Tardy and Denny 2010). Approximately 2,955 total hatchery adults were obtained from Sawtooth and outplanted in upper Yankee Fork for natural spawning. Intensive spawning ground surveys were completed in both years and 1,074 total redds were observed. In summary, we estimate a total escapement of 3,575 Chinook salmon in the Yankee Fork; 1,935 in 2008 and 1,640 in 2009.

The Tribes developed a Memorandum of Agreement (Appendix A) between IDFG and LSRCP to authorize the YFCSS activities in 2010. The Tribes planned to operate two portable picket weirs to trap and collect returning adult Chinook salmon for broodstock to produce 200,000 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 adults were planned for

outplanting in 2010. In addition, if Sawtooth was unable to collect broodstock to produce 200,000 smolts for the upper Salmon River supplementation project, this space would be available to increase the YFCSS production objective for 2010 to 400,000 smolts.

The pre-season forecasted return of hatchery-origin Chinook salmon to Sawtooth was estimated at 2,108 adults. This return was expected to be comprised of 1,679 age[4] Sawtooth fish from BY06 and 429 age[5] Sawtooth fish from BY05.

In 2010, natural-origin Chinook salmon were expected to return to Yankee Fork and we anticipated hatchery-origin adults to stray into the watershed and be trapped in the Pole Flat weir. We estimated 67 natural-origin adults would return (25 year average redd count expansion estimate assuming 2.5 spawners/redd; Matthews and Waples 1991) to the Yankee Fork in 2010. The natural-origin escapement estimate provided the basis for broodstock collection plans, as outlined in the MOA (Appendix A).

As part of the YFCSS monitoring and evaluation objectives, the Tribes installed a rotary screw trap in Yankee Fork anticipating capturing BY08 smolts and BY09 fry, 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 YFCSS Project activities in 2010.

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. Under the Tribe's Hatchery Genetics Management Plan (Appendix B), the goal will provide 500 adults to utilize spawning and rearing habitats and 1,500 adults for harvest opportunities. The Tribes are also in the planning phases of building Crystal Spring Fish Hatchery to accommodate the necessary smolt release objective to achieve the Tribes long term adult return goal.

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 forests 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^{-1}), and mean flows are 6.99 m^3s^{-1}. 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 (Pollard 1985), to less than 10 in 1980's (Konopacky et al. 1986), to zero in 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 (Tardy and Denny 2010).

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

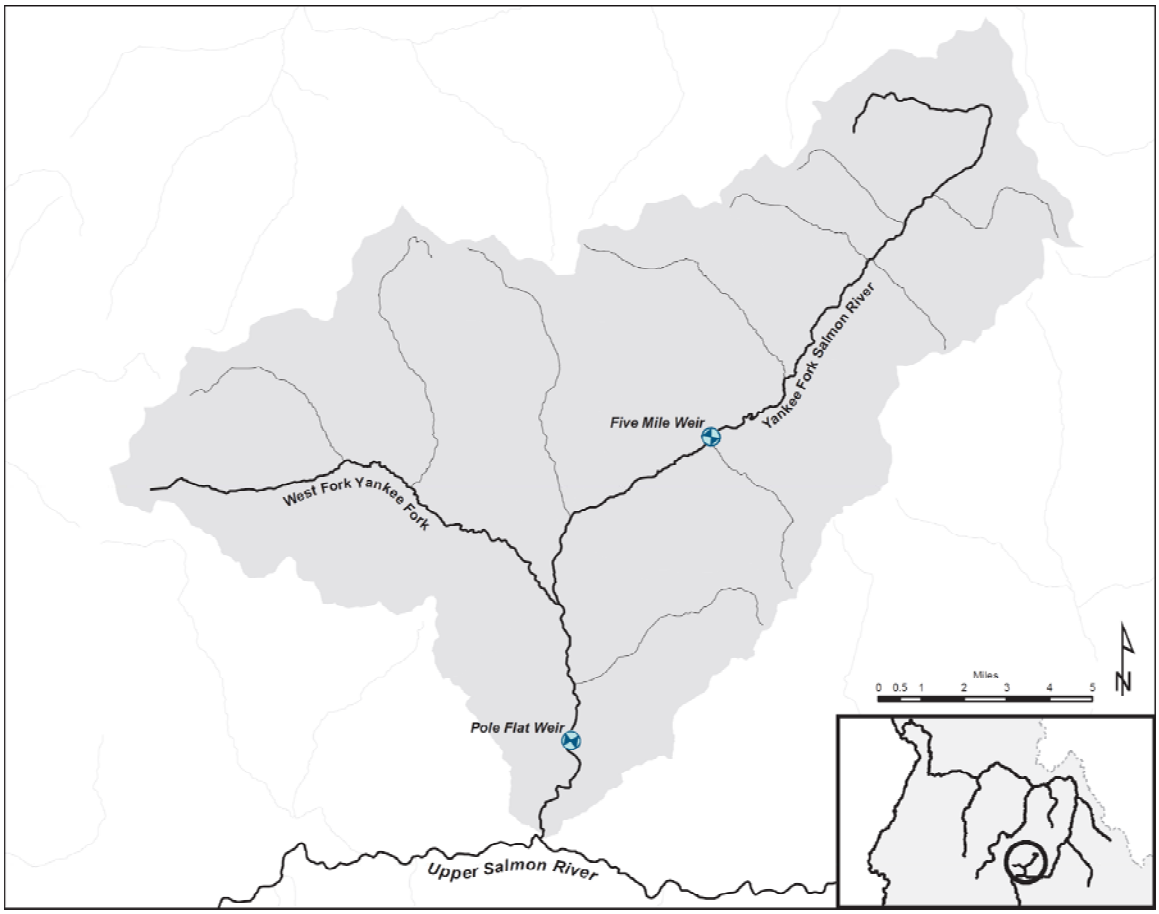

Figure 1. Map of Yankee Fork Salmon River, Idaho.

METHODS

Smolt Release

The Tribes anticipated releasing up to 400,000 Chinook salmon smolts in 2010. To accomplish this, adult fish were obtained from hatchery-origin adult broodstock collected and spawned at Sawtooth in 2008 (Denny and Tardy 2010). Broodyear 08 smolts destined for the YFCSS project were incubated and reared separately at Sawtooth from general hatchery production fish. Two groups of fish were reared for Yankee Fork, adipose clipped and adipose intact. Both groups were marked with Passive Integrated Transponder (PIT) tags, while the adipose intact groups additionally received coded-wire tags (CWTs).

The Tribes initiated an acclimation versus direct stream release study in Yankee Fork with BY08 Chinook salmon smolts. The study design was developed to address whether there is a significant survival benefit to acclimate smolts versus releasing them directly in the stream (non-acclimated). To accomplish this, equal groups of fish must be released in Yankee Fork at the same time to alleviate confounding environmental variables which affect survival. The Tribes planned to release approximately 200,000 adipose fin clipped smolts in Pond Series One (Figure 6) and contain them for two days prior to allowing volitional release on the third day. Also on the third day, the direct stream release group of 200,000 non-adipose fin clipped smolts would be

outplanted at Jordan Creek (Figure 6). Biologists plan to compare survival and timing of both groups of fish as they migrate to Lower Granite Dam as juveniles and when they return as adults.

Rotary Screw Trap

The Tribes installed a rotary screw trap in the Yankee Fork in 2010 (Figures 2 and 6) for the purposes of enumerating, tagging, and genetic tissue sampling migrating juveniles for research, monitoring, and evaluation. The rotary screw trap was installed on April 27 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 YFK81.

The rotary screw trap is a temporary structure consisting of two floating pontoons, a rotating cylindrical corkscrew cone, and a live box (Figure 2). 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. High water events on June 3 resulted in the loss of the rotary screw trap. After acquisition of a new rotary screw trap, it was reinstalled on August 21, downstream above the canyon confluence at approximately 4.8 rkm upstream from the confluence with the Salmon River.

On a daily basis, the live box on the rotary screw trap was emptied at approximately 11:00 hours 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 PIT tags after being anesthetized in a clove oil solution. 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 1 rkm upstream of the trap at Maternity Hole for mark-recapture analyses to obtain trap efficiency. Recaptures and remaining fish by species were enumerated, recorded, and released 0.4 rkm 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 2. Rotary Screw Trap.

Picket Weirs

The Tribes installed two portable picket weirs in the Yankee Fork in 2010 (Figures 1 and 6) for the purposes of enumerating the natural and hatchery adult return, collecting broodstock, and obtaining information for research, monitoring, and evaluation. The Pole Flat Weir was installed on July 9 near Pole Flat Campground approximately 5.2 rkm upstream from the confluence with the Salmon River (Figure 1 and 6). The Five Mile Weir was installed on July 11 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 YFK81.

Pole Flat Weir was installed as soon as flows were considered safe for installation (approximately 45.31 m^3s^{-1} 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 3). 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 nine counter weights supporting five 3.0 m × 0.6 m panels and 300 – 3.0 m × 1.9 cm pickets.

Figure 3. Pole Flat Weir and Trap Box.

During the winter of 2008-09, Tribal staff constructed a new trap box to accommodate larger Chinook salmon returns in the future. The trap box consists of four panels and has a dimension of 3.0 m × 3.0 m × 1.8 m (Figure 3 and 4). 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 4).

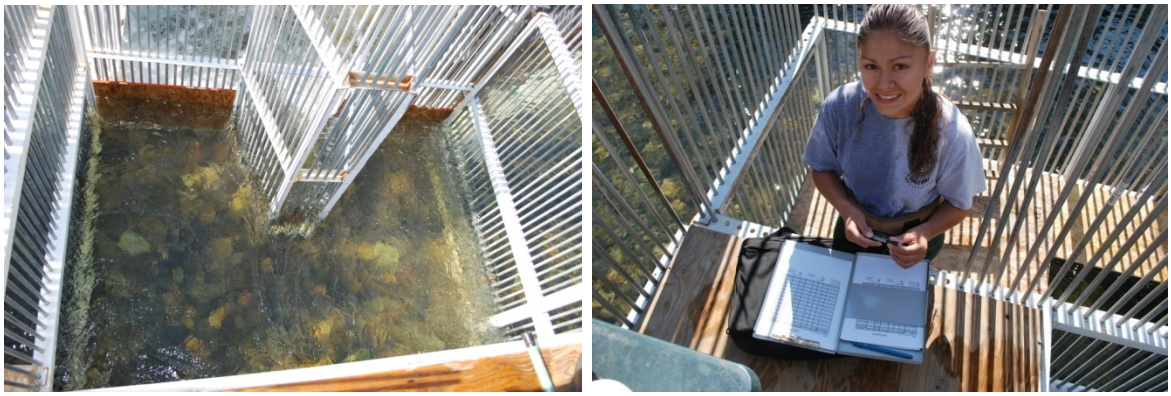

Figure 4. Pole Flat Weir Trap Box and Work Station.

Five Mile weir is a temporary structure consisting of v-shaped wings and an in-stream trap box (Figure 5). The final 2008 Pole Flat trap box was utilized for the 2009 and 2010 Five Mile structure (Denny and Tardy 2009). 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 5). 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 any outplanted hatchery adults from straying into the West Fork Yankee Fork.

Figure 5. 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), 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. All hatchery adult Chinook salmon captures are transported and outplanted above Five Mile Weir for natural spawning. Hatchery adults outplanted for natural spawning are not injected with erythromycin.

All transported adults are individually loaded and transferred 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.

Harvest Monitoring

Harvest guidelines were developed for each Fishery Management Area as per the Tribal Resource Management Plan and include the number of natural and hatchery-origin Chinook salmon available for harvest. Chinook salmon fisheries were managed to achieve escapement or broodstock goals as the first priority. The harvest framework for natural-origin populations incorporates the Viable Population Thresholds (VPT) defined by the Interior Columbia-basin Technical Recovery Team (ICTRT) for basic, intermediate, and large populations. Using the pre-season forecast, the Tribes developed a harvest guideline in 2010 for Yankee Fork based upon population specific abundance estimates developed by co-managers in Idaho. The Tribes harvest guidelines were considered maximum harvest rates for Salmon River spring/summer Chinook salmon.

The goal of harvest monitoring is to provide accurate and precise estimates of Chinook salmon harvest in all areas open to Chinook salmon fishing. This is accomplished by obtaining catch per unit effort (CPUE) data. Fishery monitors covered Yankee Fork on a daily basis from June 22 to August 15, 2010, gathering data in the field from fisherman on the amount of time fished, number of fish caught, released, type of gear used (spear, snag, hook and line), origin, mark, and length from fish harvested. Where applicable, fishery personnel collected tissue samples from harvested Chinook salmon for later verification of genetic identity.

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 two separate Fish and Wildlife Department projects including: 1) YFCSS and 2) 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 strata (Konapacky 1986) (Figure 6). On a weekly basis, observers walked Yankee Fork (Strata 1–5) during mid-day marking Chinook salmon redds and recovering carcasses. 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. Stratum 7 (Jordan Creek) and Eightmile Creek (Stratum 8) were not surveyed in 2010.

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 three 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, 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.

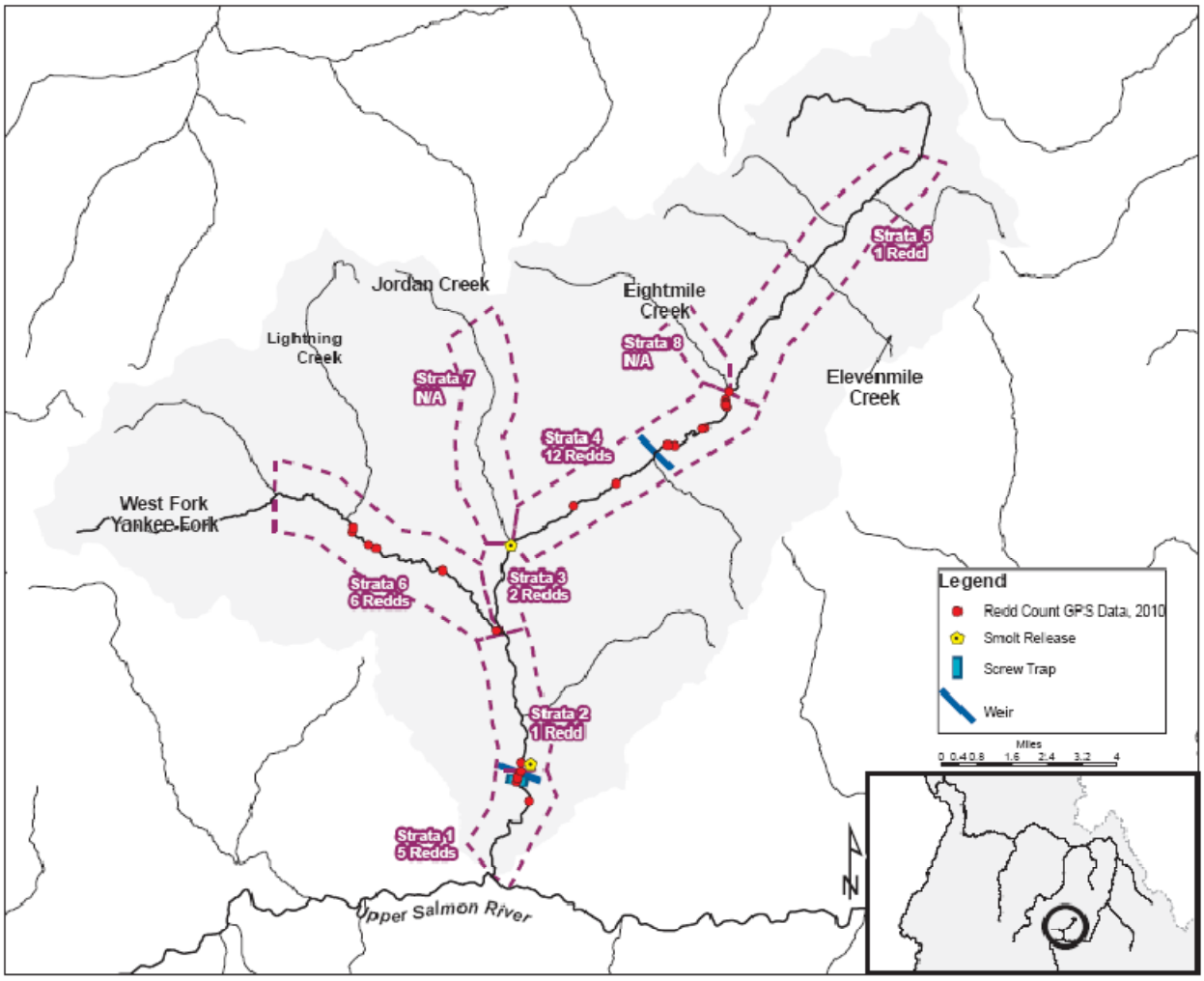

Figure 6. Picket weirs, rotary screw trap, smolt release locations, redds, and stratum.

RESULTS

Smolt Release

Broodyear 2008 Chinook salmon smolts reared at the Sawtooth Fish Hatchery for the YFCSS project were isolated in two separate raceways by indentifying mark. Raceway nine initially contained 201,882 adipose fin-clipped only juveniles; raceway ten held approximately 201,819 adipose intact coded wire tagged (CWT) only juveniles. Each group was tagged with roughly 2,195 PIT tags for a total of 4,392 PITs.

Prior to transport and release, the Tribes determined to compare direct stream versus acclimated smolt releases in Yankee Fork. Staff utilized Pond Series One (PS1) as the acclimation location by constructing a block net to ensure no migration from the pond. Direct stream release occurred in the mainstem Yankee Fork just below the Jordan Creek confluence as this location was used in 2006 for the release of BY04 Chinook salmon smolts. To compare direct release and acclimated survival, adipose fin-clipped individuals were treated as the acclimation group in PS1 and adipose intact CWT only juveniles were released at Jordan Creek confluence as the direct stream group.

Tribal and IDFG staff transported the BY08 smolts to the Yankee Fork on April 20, 21, and 23. There were 201,714 adipose fin-clipped juveniles released into PS1 and 196,730 adipose intact CWT only released directly in-river at the confluence of Jordan Creek for a total of 398,544 (4,344 PITs) smolts released (Table 1). The adipose fin clipped acclimation group was transported to Yankee Fork on April 20 and released 48 hours later on April 22. The adipose intact CWT only group was transported to Yankee Fork primarily on April 23, but some fish were released on April 21. A malfunction in the pump during loading on April 21 resulted in the loss of juveniles in the adipose intact CWT only group. Due to high levels of stress on these fish from the pump malfunction, crowding/re-crowding, and significant rainfall, staff determined to release the remaining smolts on April 23 to allow for the return of natural fish behavior.

Table 1. Broodyear 2008 Chinook salmon smolt release statistics in 2010.

Mark	Initial # Smolts (PITs)	Loading Mortalities	Release Date	Location	Final Releases (PITs)
Ad Clip Only	201,882 (2,195)	168	4/20/10	PS1	201,714 (2,190)
CWT Only	201,819 (2,197)	5,089	4/21 & 4/23/10	Mainstem	196,730 (2,154)
Total	403,701 (4,392)	5,257			**398,544 (4,344)**

Our Cormack/Jolly-Seber survival estimate for the 2010 hatchery Chinook salmon smolt releases in Yankee Fork equaled 0.509 (0.0387) to Lower Granite Dam. By group, the acclimated adipose fin-clipped juveniles showed significantly higher survival at 0.637 (0.0347) as compared to the direct stream CWT only group, 0.477 (0.0489) (Figure 7). Of the 398,544 smolts released into Yankee Fork, an estimated 222,332 survived to Lower Granite Dam (128,492 adipose fin-clipped, 93,840 adipose intact CWT only).

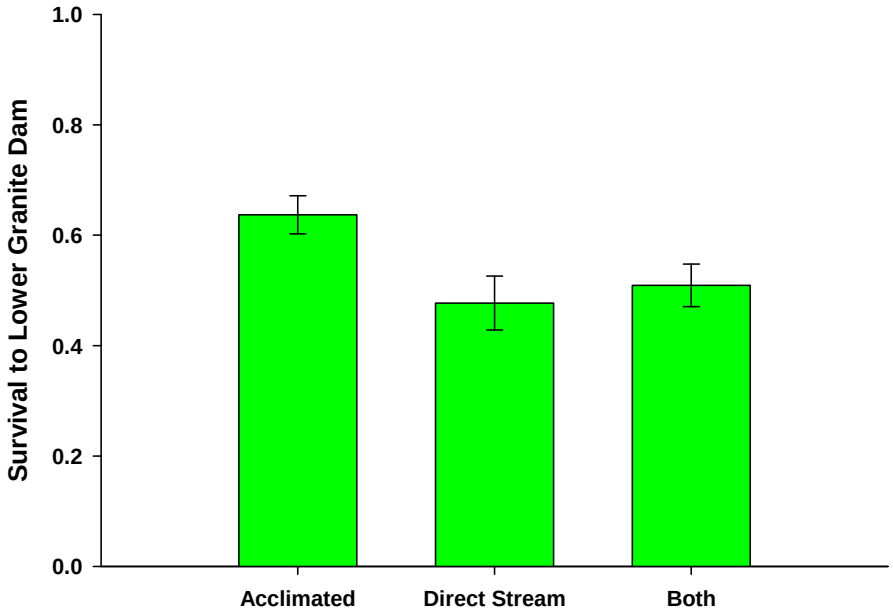

Figure 7. Survival of hatchery-origin Chinook salmon smolts released in Yankee Fork, 2010.

Juvenile Trapping

The rotary screw trap was installed on April 27 and operated for 37 days until high water events spurred the loss of the trap on June 3. A new trap was installed on August 21 and operated for an additional 88 days until removal on November 16. Staff trapped and handled a total of 38,919 juvenile individuals. Non-target species including steelhead (2,253), bull trout (1,019), cutthroat trout (322), rainbow trout (261), mountain whitefish (358), and sockeye salmon (1 adult) resulted in 4,214 captures.

In 2010, there were 34,706 juvenile Chinook salmon captured and 55 (0.0016) mortalities recorded. Staff marked a total of 1,174 juveniles and collected 1,222 genetic samples for parentage analysis and monitoring and evaluation activities. There were a total of 305 recaptures for an overall trap efficiency of 0.260 ± 0.101.

Using the methods of the ISS, staff stratified time periods by juvenile life stage and significant changes in the hydrograph to calculate a Gauss population estimate of the number of juvenile Chinook migrating passed the trap (Figure 8). ISS classifies March 1, June 1, and September 1 as arbitrary dates for fry, parr, and pre-smolt life stages.

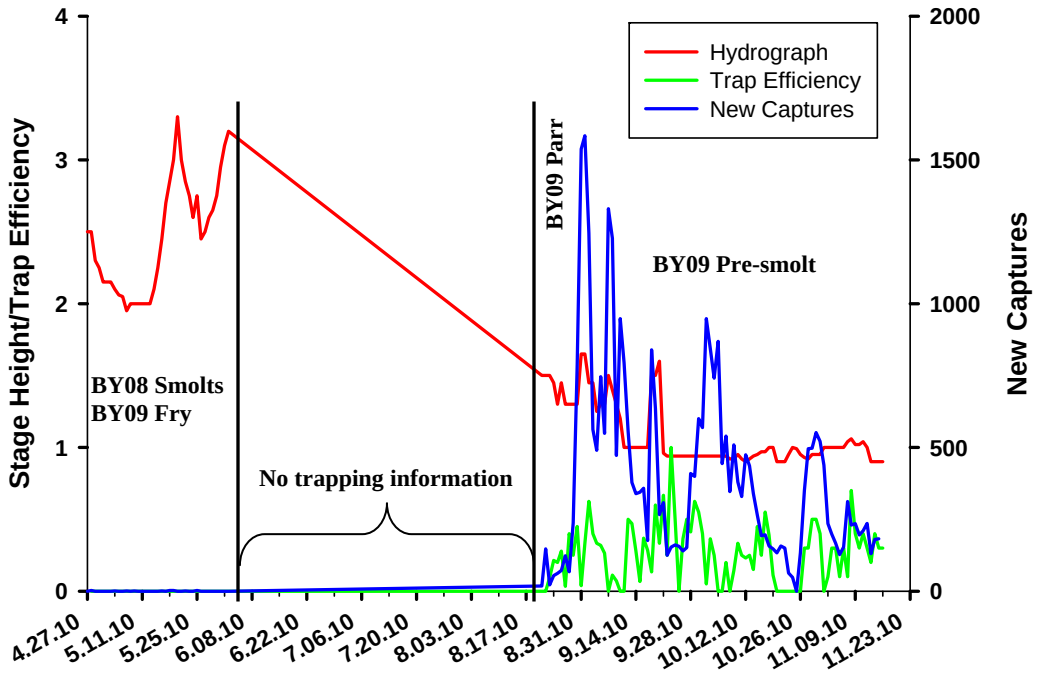

Figure 8. Yankee Fork hydrograph, trap efficiency, and emigration timing of juvenile Chinook salmon, 2010.

During the period of April 27 – June 2 and August 21 – November 16, 129,733 (SE 5,619) BY09 Chinook salmon juveniles emigrated passed the rotary screw trap. In all, staff estimates 46 (SE 10) BY09 Chinook salmon fry emigrated between April 21 and June 2, 15,114 (SE 3,369) BY09 parr from August 21 to August 31, and 114,509 (SE 7,627) BY09 pre-smolt from September 1 until trap removal on November 16, 2010. Due to insufficient mark/recapture data, estimates for BY08 smolt migrants could not be calculated. Staff assumes BY09 fry and parr estimates to

be extreme minimums as the trap was installed for only half the fry migration period and for only ten days during the parr stratification period due to trap loss in early June (Figure 9).

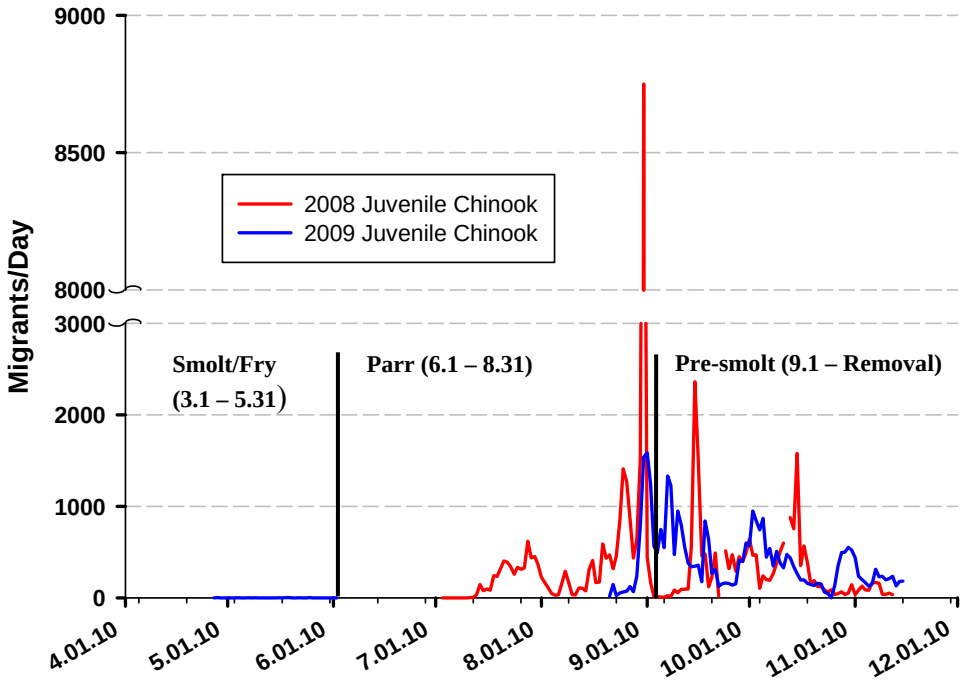

Figure 9. Juvenile Chinook salmon captures per day for 2008 and 2009.

In 2009, the Yankee Fork screw trap was installed on July 2 and operated for 133 days until removal on November 13. During the period of July 3 through November 13, 534,024 (SE 17,348) BY08 Chinook salmon juveniles (parr and pre-smolt) were estimated to have migrated downstream passed the rotary screw trap. Due to late acquisition and installation of the screw trap, estimates for BY07 smolt and BY08 fry migrants could not be calculated (Figure 9). Cormack/Jolly-Seber minimum survival estimate for BY08 natural Chinook salmon parr and pre-smolt migrating from Yankee Fork equaled 0.121 (0.0197) to Lower Granite Dam. Assuming this survival as the minimum, 64,617 out of 534,024 natural parr and pre-smolt juveniles survived to Lower Granite Dam.

Adult Trapping

Pole Flat and Five Mile weirs were installed on July 9 and July 11, respectively. The first Chinook salmon was trapped at Pole Flat Weir on July 10, one day after installation and the last fish was trapped on August 13. The Tribes operated Pole Flat Weir for 63 days and Five Mile Weir for 60 days. Pole Flat and Five Mile weirs were removed on September 9 and September 8, respectively.

A total of 17 Chinook salmon were trapped, all of which were natural-origin (Table 2). The overall male: female ratio was skewed towards males likely the result of late trap installation. One natural fish (male) was captured at the Five Mile Weir and had not been previously sampled at the Pole Flat Weir. This male was released above for natural spawning.

Table 2. Adult Chinook salmon trapping summary for Yankee Fork, 2008 – 2010.

	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%	
2010	13	4	17	0	0	0	13	4	17
Percent	76.5%	23.5%	100%	0%	0%	0%	76.5%	23.5%	

Due to low adult returns to the upper Salmon River and Yankee Fork, no adults were collected for broodstock or adult outplanting. There was no mortality at either the Pole Flat or Five Mile Weirs.

Non-Target Species

Bull trout and sockeye salmon were trapped and enumerated at Pole Flat Weir. Two bull trout were measured, tissue sampled for IDFG analysis, and released immediately above the weir (Table 3). One sockeye salmon (adipose fin-clipped) was also measured and held in the live box until IDFG staff could obtain and transport to Sawtooth. There was no mortality recorded. Bull trout captures and metrics have been appropriately reported to Scott Grunder, IDFG Native Species Coordinator. 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 3. Incidentally trapped sockeye salmon and bull trout at Pole Flat Weir, 2010.

Date	Species	Gender	Length (cm)	Disposition
4-Aug	Sockeye	F	57	Sawtooth
5-Aug	Bull Trout	M	45	Released Above
9-Aug	Bull Trout	M	59	Released Above

Run-Timing

Chinook salmon migration occurred over a 35 day period from July 10 – August 13 (Figure 10). Returning Chinook salmon exhibited bi-modal run-timing distribution. Daily trapping frequency was highest on two days, July 12 and 16, with each day three total fish being trapped.
Return timing of natural fish was significantly earlier with 50% of the adults enumerated on July 14 as compared to August 11 in 2009 (Figure 11). Fifty percent passage occurred five days post trap installation and total passage was completed a month later.

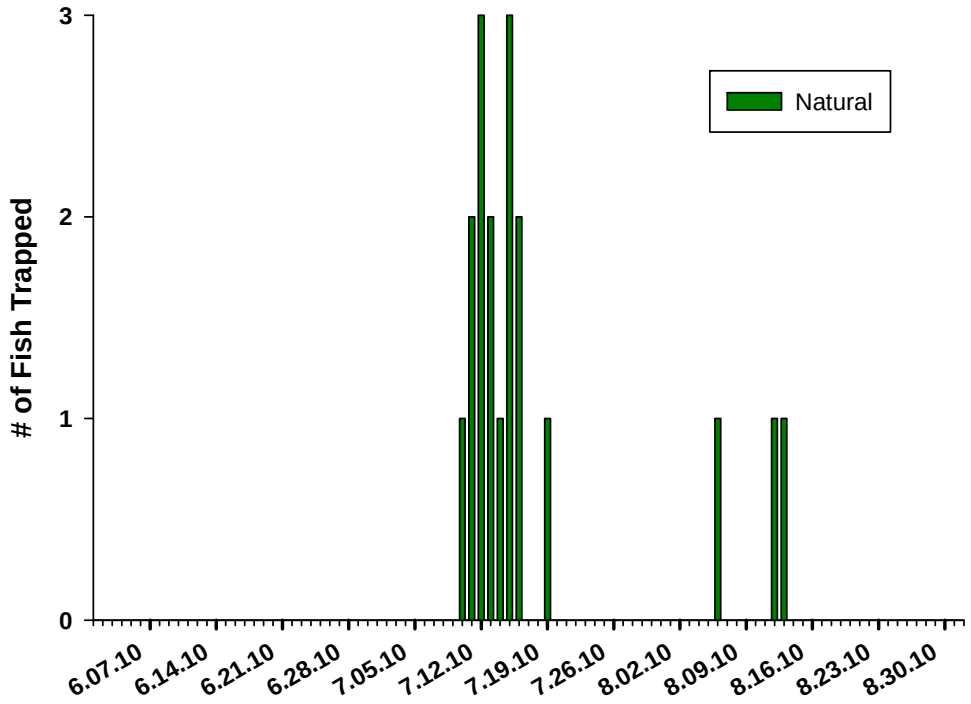

Figure 10. Daily trapping frequency of natural Chinook salmon adults at Pole Flat Weir.

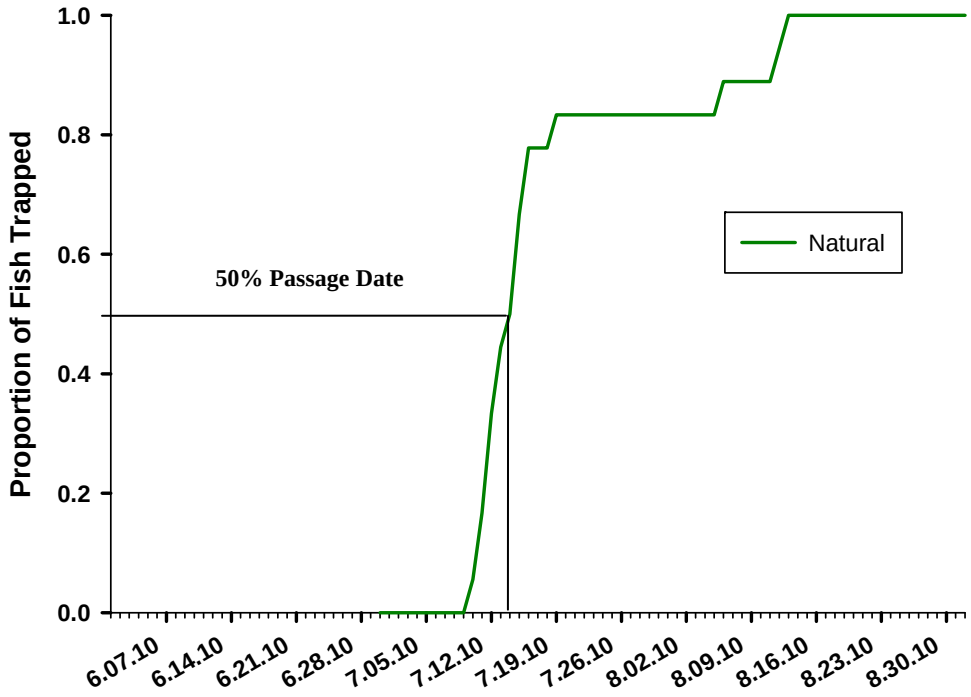

Figure 11. Run-timing of natural Chinook salmon adults at Pole Flat Weir.

Age Structure

Age categories as defined by Copeland et al. (2008) were used to estimate age at return for natural fish (Table 4). This methodology will be utilized until developing age structure categories individually for Yankee Fork.

Table 4. Age by length categories (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 methodology listed above, 13 (0.72) of the fish trapped were age^{4} adults, followed by 4 (0.22) age^{5}, and 1 (0.06) age^{3} (Table 5, Figure 12). Unlike 2008 and 2009, there were no hatchery strays either trapped at the Pole Flat Weir or identified in mark/recapture analyses during spawning ground surveys. Of the natural fish trapped at Pole Flat Weir, fork length ranged from 64 to 104 cm with an average length of 78 cm (Figure 13).

Table 5. Age composition of hatchery and natural Chinook salmon adults, 2008 – 2010.

	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%
2010	1	0	1	13	0	13	4	0	4
Percent	100%	0%	6%	100%	0%	72%	100%	0%	22%
Total	8	5	13	42	156	198	40	44	84
Percent	61.5%	38.5%	4%	21.2%	78.8%	67%	47.6%	52.4%	29%

[1]/ hatchery strays

[A]/ 2008 adult outplants: 87 age^{3} males; 755 age^{4} and age^{5} males combined and 596 age^{4} and age^{5} females combined

[B]/ 2009 adult outplants: 81 age^{3} males; 614 age^{4} males; 55 age^{5} males and 5 age^{3} females; 621 age^{4} females; 141 age^{5} females

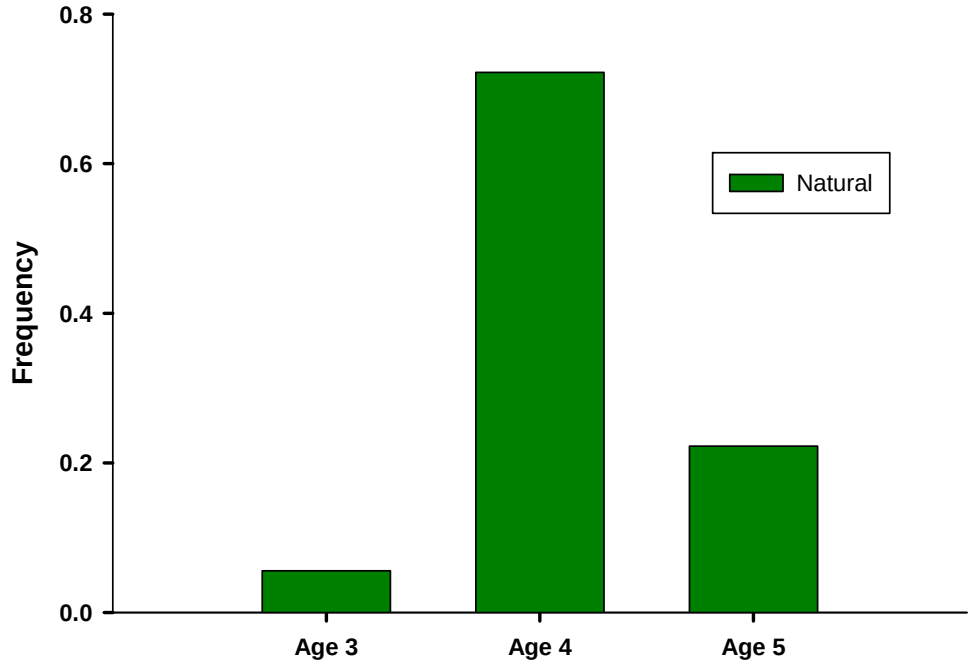

Figure 12. Age frequency of natural Chinook salmon adults collected at Pole Flat and Five Mile weirs.

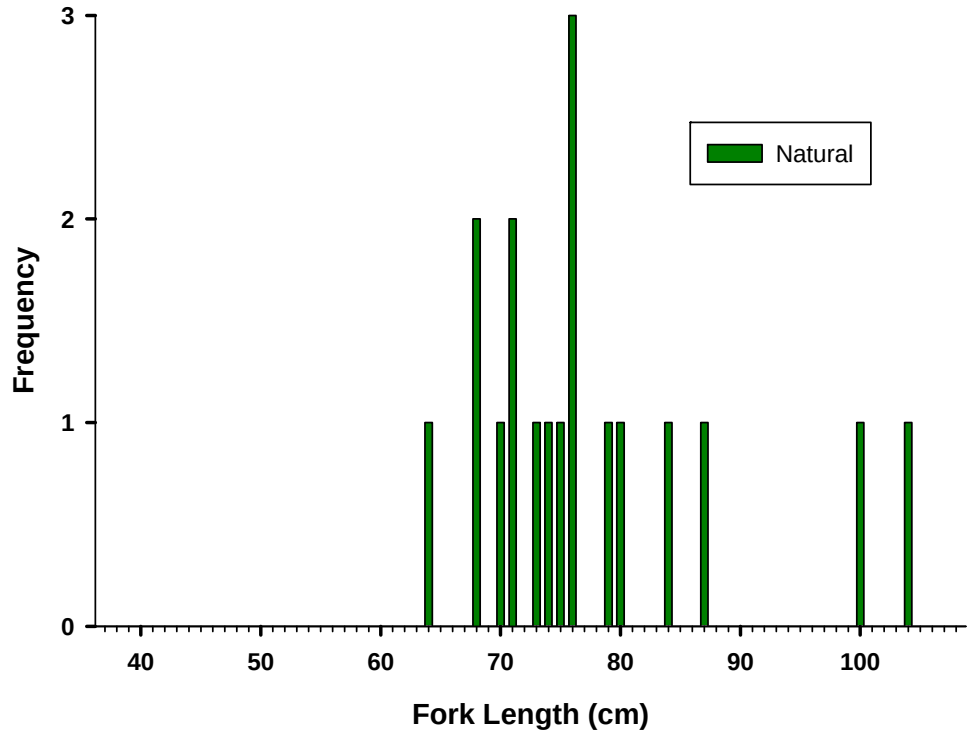

Figure 13. Length frequency of natural Chinook salmon adults collected at Pole Flat and Five Mile weirs.

Harvest Monitoring

Tribal staff conducted harvest monitoring on a daily basis to obtain a catch per unit effort (CPUE) after performing Yankee Fork production activities. Log book data entry indicates staff traveled 411 miles and spent a minimum of 54:35 hours in Yankee Fork accomplishing harvest surveys. In summary, there were 15 efforts and 16 fishing hours observed, 31 additional fishing hours expanded, one natural fish harvested (Table 6), and a season total CPUE per day of 0.021. Three natural and no hatchery adults have been harvested in Yankee Fork since initiating the program in 2008.

Table 6. Tribal harvest of Chinook salmon in Yankee Fork, 2008 – 2010.

Year	Natural Adult Harvest	Hatchery Adult Harvest
2008	1	0
2009	1	0
2010	1	0
Total	**3**	**0**

Spawning Ground Surveys

Spawning ground surveys were conducted from August 18 – September 1 to detect Chinook salmon nests, called redds. Three total passes were conducted in the five identified strata by the same monitoring group to detect newly completed redds. There were 27 total redds identified (Table 7; Figure 6 and 14).

Table 7. Number of redds observed by stratum and total in Yankee Fork in 2010.

Location	Redds Observed
Stratum 1	5
Stratum 2	1
Stratum 3	2
Stratum 4	12
Stratum 5	1
Stratum 6	6
Stratum 7	N/A
Stratum 8	N/A
Total	**27**

In stratum 1, the majority of redds were observed just below the Pole Flat Weir in excellent spawning habitat created by a landslide from fire activity in previous years. Overall, the majority of redds (13) were located in strata 4 and 5 (above the upper weir) obviously due to premium spawning habitat. Since only one adult was trapped at Five Mile Weir this suggests the weir was installed too late or fish are able to navigate pass the device. Data suggests that natural production is low in strata 2 and 3 from depressed natural adult returns and canyon/dredged habitat type not conducive to spawning.

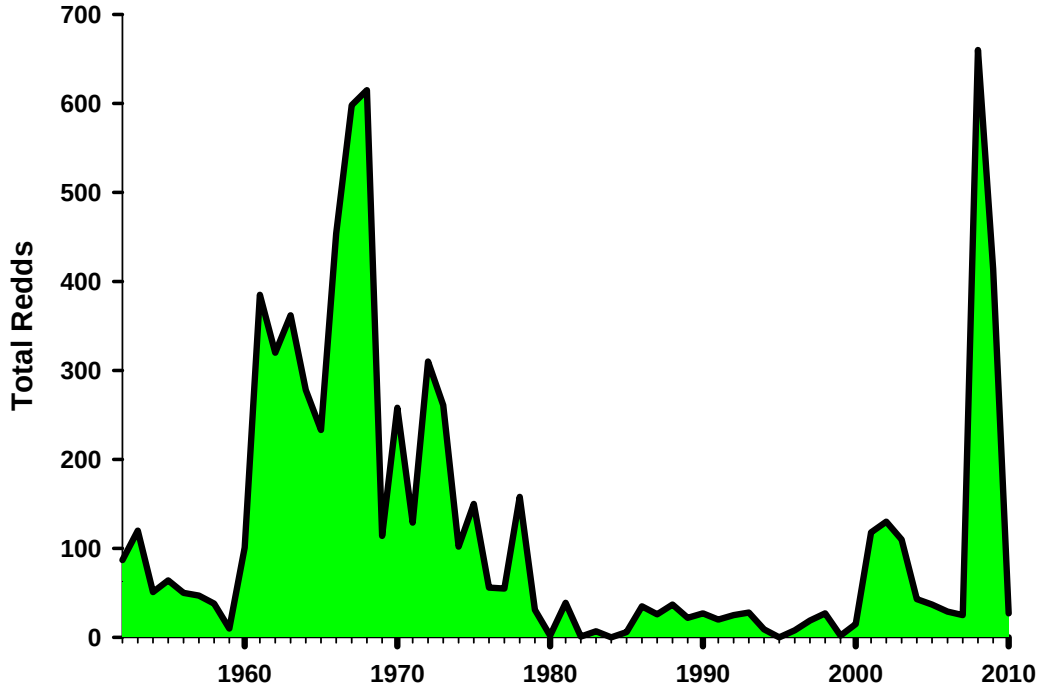

Figure 14. Chinook salmon redds observed in Yankee Fork from 1956 – 2010.

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 above Pole Flat Weir. There were 17 natural adults released above Pole Flat Weir and one above Five Mile Weir, of which six operculum punched adults were recovered in spawning ground surveys for an efficiency of 33.3%. Field crews recovered 13 natural carcasses that were not operculum punched; no hatchery carcasses were recovered. Using the Peterson Estimator (Chapman 1951):

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

Where AAW is adults above the weir, 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 53 estimated natural-origin adults above the weir with a variance of 151 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 34.0% (18/53).

Unlike in 2009, the Tribes did not utilize an adjusted fish per redd value (Peterson Addition) for three reasons: 1) natural characteristics should be similar above and below the weir; 2) no

hatchery influence in 2010; and 3) heavily skewed sex ratio from late trap installation and limited carcass recoveries. The Tribes were able to estimate adult escapement below the Pole Flat Weir by applying the fish per redd value above (2.41) to the five redds identified below the weir; resulting in 12 fish. We estimate 12 natural adults spawned below the Pole Flat Weir and 53 escaped above for a total return of 65 natural-origin adults, significantly similar to the preseason forecast (67).

Total Escapement

Using the male to female ratio observed at Pole Flat Weir, we estimate natural fish were comprised of 49 males and 16 females. Overall, we estimate 65 natural adults returned to Yankee Fork in 2010 and created a total of 27 redds (Table 8).

Table 8. Yankee Fork production values from 2006 – 2010.

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 adults	20	29	1,640	414
2010	398,544 smolts	0	18	65	27

DISCUSSION

The Yankee Fork Chinook Salmon Supplementation program is designed to incorporate habitat restoration, harvest management, and hatchery supplementation to achieve the long term goal of returning 2,000 adults and operated to identify adaptive management strategies within and between seasons. In 2010, staff identified three key results associated with 1) smolt releases, 2) screw trap operations, and 3) weir operations.

Hatchery smolt releases were conducted to investigate survival differences between direct stream and acclimated releases. Overall survival for the entire group was 0.509 (0.0387) to Lower Granite Dam. However, between groups, the acclimated release showed significantly higher survival than the direct stream release. Literature commonly suggests that elevated stress is the key contributor to juvenile fish mortality. The acclimated group was successfully transported on one day and acclimated for 48 hours prior to release; both factors reducing stress on the juveniles. In comparison, the direct stream group was released on two separate days and highly stressed due to pump malfunction and overcrowding during significant rainfall events, potentially causing the significantly lower survival to Lower Granite Dam.

Tribal staff is collecting high quality juvenile Chinook salmon emigration data, when the trap is operational. During the 2009 and 2010 season, staff has been unable to collect data for emigrating smolts due to late trap installation and insufficient mark-recapture data. Also in 2010, the trap was lost during high flows and parr emigration data was not collected for nearly three months. That said, results from screw trap operations indicate that the majority of juveniles are migrating from Yankee Fork as fry, parr, and pre-smolts and a smaller proportion as smolts.

Weir operations have improved dramatically since initiating the program in 2008. Staff has completed structural modifications to the weir and trap box annually, improving the ability to

trap, capture, and handle returning Chinook salmon adults. Skewed data points in 2010 is the direct result of late trap installation which is contingent on flow levels in the Yankee Fork. Low trapping efficiency, high proportion of males, significantly early median passage date, and the observation of numerous unmarked carcasses are clear indications that late trap installation missed the entire front portion of the run.

RECOMMENDATIONS

The Tribes will continue to operate the Yankee Fork Chinook Salmon Supplementation program to continue collecting monitor and evaluation data to improve operations through adaptive management. We anticipate the first age[3] supplementation returns in 2011 from BY08 adult outplants and BY08 hatchery smolt releases. Contingent on Yankee Fork flow, staff expects to install the Pole Flat and Five Mile weirs the third week of June to ensure capturing the entire returning salmon run. The Tribes plan to design and implement a permanent trapping structure and adult holding facility to support increased supplementation returns and program operations in the near future. In connection with increased returns to the Yankee Fork, the program will continue harvest monitoring to document and understand the advantages of supplementation to Tribal members.

The screw trap will be installed in late March with proper retrieval equipment for high spring flows in order collect sufficient smolt emigration data and operate throughout the entire season. The Tribes will expand screw trap protocols to develop a permanent site with cable anchors to ensure full seasonal operation. In addition, the program will continue to study acclimated versus direct stream survival rates to Lower Granite Dam with BY09 Chinook salmon smolt releases.

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APPENDIX A

Memorandum of Agreement

2010 Broodstock Management Plan
for
Sawtooth Fish Hatchery & Yankee Fork Satellite Facility

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 2010. This Memorandum of Agreement (MOA) describes broodstock collection and disposition, weir operations, and smolt production in 2010.

The court-approved 2008-2017 *United States vs. Oregon* (US v OR) Management Agreement identifies implementation of a Chinook salmon supplementation program in Yankee Fork starting in 2009. Notwithstanding the US v OR Management Agreement, nor prejudicing development of a long term Hatchery Genetics Management Plan (HGMP) for Yankee Fork, the expected return of hatchery-origin Chinook salmon to Sawtooth Fish Hatchery (Sawtooth) and Yankee Fork Salmon River in 2008 and 2009 provided options that were not available in previous years. Therefore, the SBT installed two portable picket weirs and trapped 228 and 49 Chinook salmon in 2008 and 2009, respectively. In addition 1,438 and 1,517 hatchery adult Chinook salmon were outplanted in 2008 and 2009, respectively. Broodstock collection during this period occured at Sawtooth due to abundant returns of hatchery-origin Chinook salmon.

In 2010, natural-origin Chinook salmon are expected to return to Yankee Fork. We anticipate hatchery-origin Chinook salmon will stray into the Yankee Fork where they will be trapped at Pole Flat weir. To minimize potential conflicts with the on-going Idaho Supplementation Studies (ISS) research in the West Fork Yankee Fork, natural-origin Chinook salmon will be collected for broodstock at Five Mile weir. Hatchery-origin fish trapped at either weir will be collected for broodstock.

Background

In 2010, the pre-season forecasted return of natural-origin Chinook salmon to Yankee Fork is 67 adults. The forecasted return of natural and hatchery-origin Chinook salmon to the Upper Salmon River and Sawtooth is 2,976 and 2,108 adults, respectively. The Sawtooth hatchery fish return is expected to be comprised of 1,679 four year old fish from BY'06 and 429 five year old fish from BY '05.

The SBT and IDFG developed draft HGMPs for Yankee Fork and Sawtooth. Both HGMPs identify 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 Agreement 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 is further agreed that implementation of the three programs should not adversely affect the completion of the on-going ISS programs in the Upper Salmon River and West Fork Yankee Fork. The SBT and IDFG agree 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 Weir would negatively impact the existing ISS hatchery evaluation research project in 2010, 2011 and 2012.
   e. The smolt release target for this supplementation program is **200,000** smolts. A shortfall in achieving the required eggs to meet this target could result in an increase in the number of adipose fin-clipped hatchery mitigation fish reared and released.
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 2010 as follows:
      i. Natural origin adult returns to the Five Mile weir.
      ii. Hatchery-origin adult strays to either Pole Flat or 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) of Tribal smolts will be addressed *prior* to the marking of BY '10 progeny at Sawtooth (~ September 2011).

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 2010:

1) In 2010, 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) enumerate and pass natural-origin Chinook salmon; b) collect hatchery-origin Chinook salmon for broodstock and transport to East Fork satellite facility; and c) trap and pass 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 and hatchery-origin Chinook salmon for broodstock and transport to East Fork satellite facility; and 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 2010 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, but may also be used to produce **200,000 smolts** for the YFCSS, if adult returns to Yankee Fork are insufficient to meet the YFCSS production goal.

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 the egg take for the Upper Salmon River Supplementation falls short of the goal required to produce the goal of 200,000 smolts the available space in the hatchery could be used to rear additional adipose fin-clipped production that could be released in the Yankee Fork River or onsite in the Upper salmon River at Sawtooth Hatchery.

Broodyear 2010 Chinook releases in the Yankee Fork will occur according to the Yankee Fork HGMP distribution schedule, 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. It is likely that hatchery-origin Sawtooth fish will continue to stray into the Yankee Fork. It hatchery-origin fish are trapped in Yankee Fork, they will be collected for broodstock and ponded at East Fork Salmon River Satellite Facility.

In order to address genetic diversity, spawn matrices for the YFCSS brood should be prioritized as follows:

Natural-Origin Yankee Fork Females
YF natural-origin females ***X*** YF natural-origin males
YF natural-origin females ***X*** hatchery-origin males (strays)
YF natural-origin females ***X*** hatchery-origin males (Sawtooth)

Hatchery-Origin Females (strays)
hatchery-origin females (strays) ***X*** YF natural-origin males
hatchery-origin females (strays) ***X*** hatchery-origin males (strays)
hatchery-origin females (strays) ***X*** hatchery-origin males (Sawtooth)

Trap Operations

In 2008, the Pole Flat weir trapped 64.6% of the returning Chinook salmon entering Yankee Fork (Denny et al. 2010). 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 improved the SBT's ability to collect and safely handle adult Chinook salmon and allowed the SBT to install the Five Mile weir earlier in the season. In 2009, Pole Flat weir trapped 96.1% of the returning Chinook salmon (Tardy et al. 2010). The Pole Flat weir was installed on June 30 and removed on September 15. The Five Mile weir was installed on July 1 and removed on September 22, after spawning was completed to ensure no downstream migration of hatchery-origin adults occurred.

In 2008 and 2009, natural-origin Chinook salmon adult returns remained extremely low (Table 1). Given the YFCSS activities in 2008 and 2009, redd counts achieved 660 and 414, respectively.

Summary of activities and findings of the YFCSS.

Year	Releases	Trapped at Lower Weir		Passed Weir Undetected	Spawned Below Lower Weir	Estimated Escapement	Redds Produced
		Hatchery Origin	Natural Origin				
2006	135,934 smolts	--	--	--	--	--	21
2007	--	--	--	--	--	--	18
2008	1,438 adults	185	43	125	144	1,935	660
2009	1,517 adults	20	29	2	72	1,640	414

Depending upon spring runoff conditions, trapping operations in 2010 will begin between mid-June and continue through mid-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. SBT 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 hatchery-origin adults collected at Pole Flat or Five Mile weirs will be collected for broodstock. 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

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 is responsible for consulting with NOAA Fisheries on any potential adverse impacts to critical habitat related to the operation of these weirs.

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 2010 will not be injected with erythromycin or given an anesthetic.

General Monitoring 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. SBT staff will obtain tissue samples, fork length, gender, CWT, or PIT tag information from harvested Chinook. Tribal fisherman will be provided with scale envelops to preserve scales from harvested fish not surveyed and sampled. Total fish harvested, 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 in lower 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 2010 YFCSS program by December 31, 2010 to the LSRCP, IDFG, USFS, and NOAA-Fisheries as part of the FY-2010 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

Denny, L.P., and K.A. Tardy. 2010. Yankee Fork Salmon River Adult Chinook Salmon Run Report. Draft Annual Report 2008. Shoshone-Bannock Tribes.

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.

Tardy, K.A., and L.P. Denny. 2010. Supplementation, Monitoring, and Evaluation Program. Draft Annual Report 2009. Shoshone-Bannock Tribes.

Authorization

Signatories below indicate support for the 2010 broodstock management plan for Sawtooth Hatchery and Yankee Fork Salmon River.

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

APPENDIX B

HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	Yankee Fork Chinook Salmon Supplementation Project
Species or Hatchery Stock:	Chinook Salmon (Oncorhynchus tshawytscha)
Agency/Operator:	Shoshone-Bannock Tribes
Watershed and Region:	Yankee Fork Salmon River, Idaho
Date Submitted:	_____ __, 2010
Date Last Updated:	April 23, 2010

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Hatchery: Sawtooth Fish Hatchery (egg incubation and juvenile rearing)
Yankee Fork Salmon River Weirs (adult trapping)
East Fork Salmon River Satellite Facility (adult holding and spawning)

Program: Yankee Fork Chinook Salmon Supplementation (YFCSS) Project

1.2) Species and population (or stock) under propagation, and ESA status.

Chinook salmon (*Oncorhynchus tshawytscha*) native to the Yankee Fork Salmon River will be supplemented with hatchery Chinook salmon returning to the Sawtooth Fish Hatchery. Yankee Fork Chinook salmon are ESA-listed as threatened (57 FR 14653) and part of the Snake River spring/summer Chinook salmon Evolutionarily Significant Unit (ESU). Hatchery fish returning to Sawtooth are ESA-listed as threatened and part of the Upper Salmon River Chinook salmon distinct population segment, which is also part of the ESU. However, Sawtooth hatchery Chinook salmon are surplus to recovery.

1.3) Responsible organization and individuals

Lead Contact

Name (and title): Lytle P. Denny, Anadromous Fish Manager
Agency or Tribe: Shoshone-Bannock Tribes
Address: 3rd and B Avenue, P.O. Box 306, Fort Hall, ID 83203
Telephone: (208) 239-4560 or cell 221-9058
Fax: (208) 478-3986
Email: ldenny@sbtribes.com

Sawtooth Fish Hatchery

Name (and title): Brent Snider, Fish Hatchery Manager II, Sawtooth Fish Hatchery
Agency or Tribe: Idaho Department of Fish and Game
Address: HC 64 Box 9905 Stanley, ID 83278
Telephone: (208) 774-3684
Fax: (208) 774-3413
Email: brent.snider@idfg.idaho.gov

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

- U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan (LSRCP) Office: Administers the LSRCP as authorized by the Water Resources Development Act of 1976. The LSRCP owns Sawtooth Fish Hatchery and funds the Tribes YFCSS.

- Idaho Department of Fish and Game (IDFG) receives funding from the LSRCP to operate and maintain (O&M) the Sawtooth Fish Hatchery.

1.4) Funding source, staffing level, and annual hatchery program operational costs.

The Shoshone-Bannock Tribes (Tribes) are the lead fisheries management agency for the YFCSS project. The Tribes are funding by the LSRCP and Bonneville Power Administration (BPA). IDFG (i.e. Sawtooth Fish Hatchery) is funded by the LSRCP.

In FY 2010, the LSRCP provided the Tribes with $279,232.00 for the YFCSS. Approximately 47% of FY 2010 LSRCP funds are earmarked for operations and maintenance, with 53% for monitoring and evaluation. In addition, the Tribes are currently developing a statement of work with BPA to assist with YFCSS costs. BPA funding is part of the Tribes Columbia Basin Fish Accord. The exact level of BPA funding specific to the YFCSS for FY2010 has yet to be determined, but it's likely to be at least 60% of the FY2010 proposal, or $168,540.00. In summary, the Tribes will operate on an estimated $447,772.00 in FY 2010. This funding estimate will support four permanent staff and three seasonal employees.

The LSRCP provides an estimated $827,555.00 to Sawtooth Fish Hatchery for operations and maintenance. Current staffing levels include five permanent staff and 80 months of temporary worker time.

1.5) Location(s) of hatchery and associated facilities.

Pole Flat Weir – Pole Flat weir is located adjacent to Pole Flat Campground approximately 5.2 river kilometers (rkm) upstream from the confluence with the Salmon River. The hydrologic unit code for the weir is 17060201. Pole Flat weir will be used to collect adult broodstock for the YFCSS project until a permanent satellite facility is constructed in the Yankee Fork.

Five Mile Weir – Five Mile weir is located above Five Mile Creek approximately 21.5 rkm upstream from the confluence with the Salmon River. The hydrologic unit code for the weir is 17060201. Five Mile weir will be used to collect adult broodstock for the YFCSS project and as an adult blocking weir when hatchery adults are outplanted for natural spawning.

Sawtooth Fish Hatchery – Sawtooth is located on the upper Salmon River approximately 8.0 km south of Stanley, Idaho. The rkm code for the facility is 503.303.617. The hydrologic unit code for the facility is 17060201. Sawtooth Fish Hatchery will provide egg incubation and juvenile rearing facilities for the YFCSS project, until a permanent facility is constructed at Crystal Springs Fish Hatchery.

East Fork Salmon River Satellite Facility – The East Fork Satellite is located approximately 29 rkm upstream of the confluence with the Salmon River. The rkm code for the facility is 522.303.552.029. The hydrologic unit code for the facility is 17060201. The Tribes are using the East Fork Satellite for adult holding and spawning, until permanent facilities are constructed in the Yankee Fork.

Crystal Spring Fish Hatchery and Yankee Fork Satellite – Crystal Springs is located 4.7 km southeast of Springfield, Idaho. The Tribes acquired funding from BPA through the Columbia Basin Fish Accord to re-construct Crystal Spring Fish Hatchery and build a satellite facility in Yankee Fork. It is anticipated that Crystal Springs and the Yankee Fork Satellite will be

completed in 2012. Crystal Springs will provide egg incubation and juvenile rearing; Yankee Fork Satellite will provide adult holding, spawning, and juvenile acclimation.

1.6) Type of program.

Integrated Recovery Program

The goal of the YFCSS project is to restore Chinook salmon in the Yankee Fork to a level that can provide sustainable fishing opportunities. This will be accomplished when 2,000 adults return to meet the conservation, harvest, and broodstock objectives. To meet the conservation and harvest objectives, the Tribes propose to outplant up to 600,000 yearling Chinook salmon smolts, up to 1,500 adult outplants, and various levels of eyed-eggs. For planning purposes, we assumed smolt-to-adult survival for YFCSS smolts at 0.3%. However since Crystal Springs Fish Hatchery is not yet developed, the Tribes, IDFG and LSRCP agree to produce at least 200,000 yearling Chinook salmon for release into the Yankee Fork at Sawtooth Fish Hatchery, until CSFH is complete.

Juvenile Chinook salmon will be produced from an integrated recovery component developed from fish spawning naturally (N x N, N x H, H x H). If returns of adults from the integrated recovery program are in excess of those needed to maintain the production of 200,000 smolts for the integrated component, they will be used to meet escapement and harvest objectives.

The integrated recovery component will contain a similar degree of genetic continuity with the naturally spawning population, thereby reducing adverse effects of interactions on the spawning grounds. All releases from both integrated recovery components will occur upstream of the Pole Flat weir.

Broodstock for the integrated recovery component will be collected at the Yankee Fork weirs. The number of natural-origin adults used each year for broodstock and the number of integrated hatchery-origin fish allowed to spawn naturally above the weir will be based on a sliding scale broodstock management schedule designed to achieve a 8-year running average proportionate natural influence (PNI) significantly greater than 0.3. Maintaining a minimum PNI is expected to encourage local adaptation and increase the productivity of the naturally spawning population.

Key performance standards for the program will be tracked in a targeted monitoring and evaluation program. These standards include: (1) abundance and composition of natural spawners and hatchery broodstock (pHOS, pNOB, and PNI); (2) number of smolts released; (3) in-hatchery and post-release survival rates; (4) total adult recruitment, harvest and escapement of the natural and hatchery components; and (5) abundance, productivity, diversity and spatial structure of the naturally spawning spring Chinook population.

1.7) Purpose (Goal) of program.

Restoration

The goal of the YFCSS project is to restore Chinook salmon in the Yankee Fork to a level that can provide sustainable fishing opportunities. Supplementation efforts from this program are mandated in the *U.S. v Oregon* 2008 – 2017 Management Agreement.

1.8) Justification for the program.

Yankee Fork Chinook salmon are at an extremely high risk of extinction. The ICTRT (2007) recently estimated the 10-year geometric mean adult abundance for Yankee Fork at 13 adults with productivity of 0.80 recruits/spawner (R/S) (Figure 1).

Yankee Fork Chinook will be considered "maintained" when the A/P risk threshold is less than a 25% risk of extinction in 100 years. To be considered maintained, the population can range from 200 adults with a productivity of 5.0 to 1,500 adults with a productivity of 1.0 (Figure 1). It is highly unlikely that abundance or productivity is going to drastically change. In fact, the Biological Review Team (2005) anticipates that over the next ten years, Yankee Fork Chinook productivity may only increase to 1.03 R/S (FCRPS 2008).

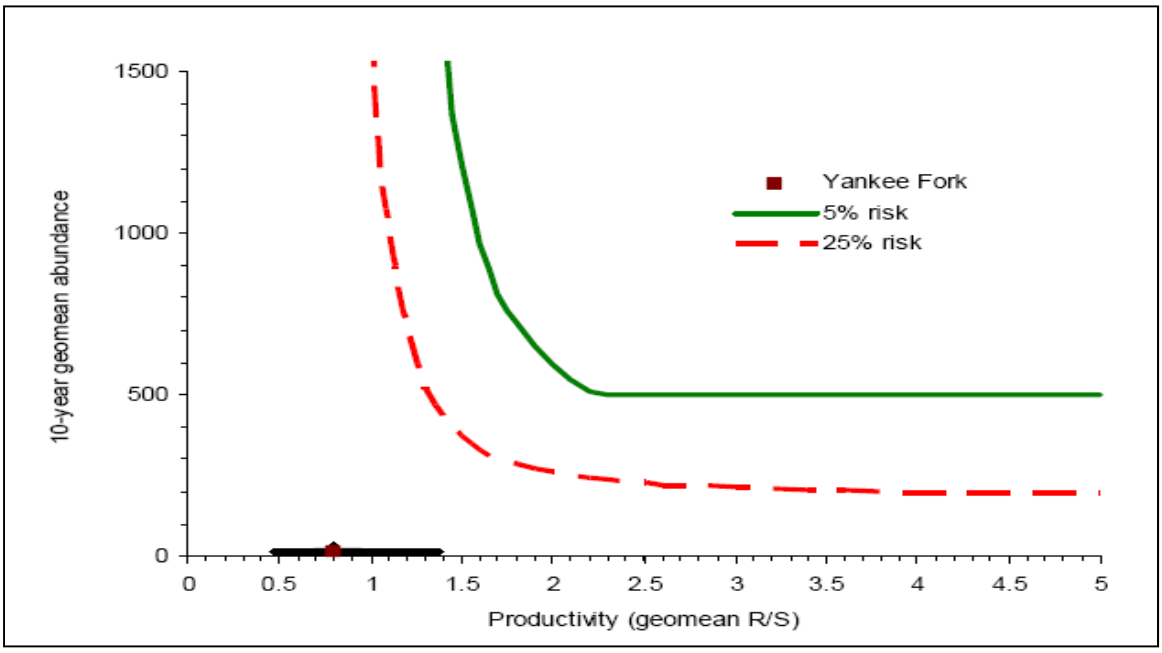

Figure 15. Yankee Fork Chinook A/P metrics against a Hockey-Stick viability curve.

In order to achieve recovery standards as a maintained population, and considering Yankee Fork Chinook can expect to see an increase in R/S from 0.68 to 1.03, the minimum conservation objective as defined by a 10-year geometric mean is 1,500 adults. By annually supplementing the Yankee Fork with fish from the integrated recovery program, we will be able to achieve our conservation and harvest objectives.

1.9) List of program "Performance Standards."

3.1 Legal Mandates
3.2 Harvest
3.3 Conservation of natural spawning populations
3.4 Life History Characteristics
3.5 Genetic Characteristics
3.6 Research Activities
3.7 Operation of Artificial Production Facilities
3.8 Socio-Economic Effectiveness

1.10) List of program "Performance Indicators," designated by "benefits" and "risks."

Note: Performance Standards and Indicators used to develop Sections 1.10.1 and 1.10.2 were taken from the final January 17, 2001 version of Performance Standards and Indicators for the Use of Artificial Production for Anadromous and Resident Fish Populations in the Pacific Northwest. Numbers referenced below correspond to numbers used in the above document.

1.10.1) "Performance Indicators" addressing benefits.

3.1.1 **Standard**: Program contributes to fulfilling tribal trust responsibility mandates and treaty rights, as described in the applicable agreements such as under *U.S. v. Oregon* and *U.S. v. Washington*.

Indicator 1: Total number of fish harvested in tribal fisheries targeting this program.
Indicator 2: Total fisher days or proportion of harvestable return taken in tribal resident fisheries, by fishery.
Indicator 3: Tribal acknowledgement regarding fulfillment of tribal treaty rights.

3.1.2 **Standard**: Program contributes to mitigation requirements.

Indicator 1: Number of fish returning to mitigation requirements estimated.

3.1.3 **Standard**: Program addresses ESA responsibilities.

Indicator 1: ESA consultation(s) under Section 7 have been completed, Section 10 permits have been issued, or HGMP has been determined sufficient under Section 4(d), as applicable.

3.2.1 **Standard**: Fish produced for harvest are produced and released in a manner enabling effective harvest, as described in all applicable fisheries management plans, while avoiding over-harvest of non-target species.

Indicator 1: Annual number of fish produced by this program caught in all fisheries, including estimates of fish released and associated incidental mortalities, by fishery.
Indicator 2: Annual numbers of each non-target species caught (including fish retained and fish released/discarded) in fisheries targeting this population.
Indicator 3: Recreational angler days, by fishery.
Indicator 4: Annual escapements of natural populations that are affected by fisheries targeting program fish.

3.2.2 **Standard**: Release groups sufficiently marked in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries.

Indicator 1: Marking rate by type in each release group documented.

3.3.1 **Standard**: Artificial propagation program contributes to an increasing number of spawners returning to natural spawning areas.

Indicator 1: Annual number of spawners on spawning grounds, by age.
Indicator 2: Spawner-recruit ratios.
Indicator 3: Annual number of redds in selected natural production index areas.

3.3.2 **Standard**: Releases are sufficiently marked to allow statistically significant evaluation of program contribution.

Indicator 1: Marking rates and type of mark documented.
Indicator 2: Number of marks identified in juvenile and adult groups documented.

1.10.2) "Performance Indicators" addressing risks.

3.4.1 **Standard**: Fish collected for broodstock are taken throughout the return in proportions approximating the timing and age structure of the population.

Indicator 1: Temporal distribution of broodstock collection managed.
Indicator 2: Age composition of broodstock collection managed.

3.4.2 **Standard**: Broodstock collection does not significantly reduce potential juvenile production in natural areas.

Indicator 1: Number of spawners of natural origin removed for broodstock.
Indicator 2: Number and origin of spawners migrating to natural spawning areas.
Indicator 3: Number of eggs, juveniles, or adults placed in natural rearing areas.

3.4.3 **Standard**: Life history characteristics of the natural population do not change as a result of this program.

Indicator 1: Life history characteristics of natural and hatchery-produced populations are measured (e.g., juvenile dispersal timing, juvenile size at outmigration, juvenile sex ratio at outmigration, adult return timing, adult age and sex ratio, spawn timing, hatch and swim-up timing, rearing densities, growth, diet, physical characteristics, fecundity, egg size).

3.4.4 **Standard**: Annual release numbers do not exceed estimated basin-wide and local habitat capacity.

Indicator 1: Annual release numbers from all programs in basin and subbasin, including size and life-stage at release, and length of acclimation, by program.
Indicator 2: Location of releases and natural rearing areas.
Indicator 3: Timing of hatchery releases, compared to natural populations.

3.5.1 **Standard**: Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.

Indicator 1: Genetic profiles of naturally produced and hatchery-produced adults developed.

3.5.2 **Standard**: Collection of broodstock does not adversely impact the genetic diversity of the naturally spawning population.

Indicator 1: Total number of natural spawners reaching the collection facility.
Indicator 2: Total number of spawners estimated to pass the collection facility to spawning areas, compared to minimum effective population size (when established) required for those natural populations.
Indicator 3: Timing of collection compared to overall run timing.

3.5.3 **Standard**: Artificially produced adults in natural production areas do not exceed appropriate proportion.

Indicator 1: The ratio of observed and/or estimated total numbers of artificially produced fish on natural spawning grounds, to total number of naturally produced fish, for each significant spawning area.
Indicator 2: Observed and estimated total numbers of naturally produced and artificially produced adults passing a counting station close to natural spawning areas.

3.5.4 **Standard**: Juveniles are released in natural acclimation areas to maximize homing ability to intended return locations.

Indicator 1: Location of juvenile releases.
Indicator 2: Length of acclimation period.
Indicator 3: Release type, whether forced, volitional, or direct stream release.
Indicator 4: Adult straying documented.

3.5.5 **Standard**: Juveniles are released at fully smolted stage of development.

Indicator 1: Level of smoltification at release documented.
Indicator 1: Release type (e.g., forced or volitional) documented.

3.5.6 **Standard**: The number of adults returning to the hatchery that exceeds broodstock needs is declining.

Indicator 1: The number of adults in excess of broodstock needs documented in relation to mitigation goals of the program.

3.6.1 **Standard**: The artificial production program uses standard scientific procedures to evaluate various aspects of artificial production.

Indicator 1: Scientifically based experimental design with measurable objectives and hypotheses.

3.6.2. **Standard**: The artificial production program is monitored and evaluated on an appropriate schedule and scale to address progress toward achieving the experimental objectives.

Indicator 1: Monitoring and evaluation framework including detailed time line.
Indicator 2: Annual and final reports.

3.7.1 **Standard**: Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols.

Indicator 1: Annual reports indicating level of compliance with applicable standards and criteria.

3.7.3 **Standard**: Water withdrawals and in stream water diversion structures for artificial production facility operation will not prevent access to natural spawning areas, affect spawning, or impact juveniles.

Indicator 1: Water withdrawals documented – no impacts to listed species.
Indicator 2: NMFS screening criteria adhered to.

3.7.4 **Standard**: Releases do not introduce pathogens not already existing in the local populations and do not significantly increase the levels of existing pathogens.

Indicator 1: Certification of juvenile fish health documented prior to release.

3.7.5 **Standard**: Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines.

Indicator 1: Number and location(s) of carcasses distributed to habitat documented.

3.7.6 **Standard**: Adult broodstock collection operation does not significantly alter spatial and temporal distribution of natural population.

Indicator 1: Spatial and temporal spawning distribution of natural population above and below trapping facilities monitored.

3.7.7 **Standard**: Weir/trap operations do not result in significant stress, injury, or mortality in natural populations.

Indicator 1: Mortality rates in trap documented.
Indicator 2: Prespawning mortality rates of trapped fish in hatchery or after release documented.

3.7.8 **Standard**: Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish.

Indicator 1: *Size and time of release of juvenile fish documented and compared to size and timing of natural fish.*

Release time will coincide with natural emigration. Predation will be incidental for two reasons: Chinook salmon are not piscivorous and emigration occurs almost immediately.

3.8.3 **Standard**: Non-monetary societal benefits for which the program is designed are achieved.

Indicator 1: Number of adult fish available for tribal ceremonial use.
Indicator 2: Recreational fishery angler days, length of season, and number of licenses purchased.

1.11) Expected size of program.

1.11.1) Proposed annual broodstock collection level (maximum number of adult fish).

To achieve the full smolt release target of 600,000 smolts, approximately 406 pairs of Chinook salmon are necessary to meet the long-term program management objectives. However, while we are operating with Sawtooth Fish Hatchery, we will need approximately 120 pairs of Chinook salmon to sustain the interim smolt release objective of 200,000 juveniles. If additional rearing space becomes available at Sawtooth, then more adults will be collected for broodstock.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and location.

Table 9. *Actual* and Proposed releases of Chinook salmon in Yankee Fork for years 2008-2017.

Brood Year	Broodstock	Releases
2008	*Sawtooth*	*1,438 adults; 400,000 smolts*
2009	*Sawtooth*	*1,517 adults;* 400,000 smolts*; 450,000 eyed eggs*
2010	Sawtooth	Surplus adults; 200,000 smolts
2011	Sawtooth	Surplus adults; 200,000 smolts
2012	Integrated	200,000 smolts
2013	Integrated	200,000 smolts
2014	Integrated	200,000 smolts
2015	Integrated	200,000 smolts
2016	Integrated	200,000 smolts
2017	Integrated	200,000 smolts

Table 2. Release locations for YFCSS project.

Life Stage	Release Location	Elevation (ft)	Annual Release

Adult	Eightmile Creek Confluence 11T 689401 E – 4921950 N	6,817	1,500
Yearling	Jordan Creek Confluence 11T 681560 E – 4916396 N	6,375	200,000
Eyed-Eggs	Pond Series 1 and/or 4 P1: 11T 682150 E – 4909094 N P4: 11T 681309 E – 4912923 N	6,161 6,269	225,000 225,000

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels.

Performance, production, and survival rates from Chinook salmon releases into the upper Salmon River at the Sawtooth and for Yankee Fork (BY04) are presented as production guidelines for the YFCSS (Table 3 and 4). East Fork Salmon River smolt releases were terminated in 1995 and Valley Creek supplementation was never implemented and, consequently, no information is provided.

Table 3. Performance of Chinook salmon released into the upper Salmon River at SFH from 1987-2006. Data taken from SFH Brood Year and Run Year reports.

			Return Age From BY				
Brood Year	Number Released	Year Released	1-ocean	2-ocean	3-ocean	Total	SAR (%)
1986	1,705,500	1987 - 88	428	1,410	326	2,164	0.127
1987	2,092,595	1988 - 89	112	199	109	420	0.020
1988	1,895,600	1989 - 90	41	246	475	762	0.035
1989	650,600	1991	15	77	26	118	0.018
1990	1,263,864	1992	29	63	6	98	0.008
1991	774,583	1993	5	7	7	19	0.002
1992	213,830	1994	8	24	25	57	0.026
1993	334,313	1994 - 95	20	74	23	117	0.035
1994	25,006	1996	0	3	4	7	0.028
1995	4,650	1997	0	12	37	49	1.010
1996	43,161	1998	60	135	32	227	0.526
1997	217,336	1999	279	1,219	327	1,825	0.840
1998	123,425	2000	176	531	131	838	0.679
1999	57,134	2001	65	98	27	190	0.033
2000	385,761	2002	522	1,281	175	1,978	0.500
2001	1,105,169	2003	654	1182	(2006)	-	-
2002	821,415	2004	204	(2006)	(2007)	-	-
2003	134,812	2005	(2006)	(2007)	(2008)	-	-
2004	1,416,610	2006	(2007)	(2008)	(2009)	-	-

Table 4. YFCSS returns for BY04 release.

			Return Age From BY				
Brood Year	Number Released	Year Released	1-ocean	2-ocean	3-ocean	Total	SAR (%)

2004	135,934	2006	NA	357	24	> 381	> 0.280

Below are the performance measures used for planning the YFCSS project. The performance values were obtained from performance of Chinook salmon at Sawtooth Fish Hatchery (Table 5).

Table 5. Expected performance measures used to develop broodstock needs for YFCSS.

Total Number of Females Taken	60	Calculations	Results
Pre-spawning Mortality[1]	8%	60 x .92	55 females spawn
Fecundity[2]	4,300	4,300 x 55	236,500 green eggs
Green Egg to Smolt Survival[3]	85%	236,500 x .85	≈ 200,000 smolt
Smolt to Adult Return[4]	0.3%	200,000 x .003	600 adults

[1]The ten-year average (brood year 1992-2001) of adult mortality for SFH is 4%. YFCSS expects 8% mortality for additional trap and weir mortality as well as handling and transportation stress.
[2]Fecundity at SFH is 4,300 eggs per female.
[3]SFH average of green egg to smolt survival is 85%.
[4]Tribes anticipate a 0.3% SAR to achieve a return of approximately 600 adults.

1.13) Date program started (years in operation), or is expected to start.

First operations were initiated in 2006 with the release of 135,934 BY04 smolts. Chinook salmon trapping began in 2008 and will continue annually throughout the duration of the program. In BY 08 and 09, adults in excess of programmatic needs at Sawtooth were outplanted in upper Yankee Fork for natural spawning. The Tribes proposed to outplant up to 1,500 adult Chinook salmon in 2008 – 2011, prior to transitioning to an integrated broodstock. A total of 1,438 and 1,517 adults outplanted in 2008 and 2009, respectively. In addition, approximately 450,000 eyed eggs were outplanted in 2009.

1.14) Expected duration of program.

This program is expected to continue until the 10-year geomean adult spawners abundance is >2,000 adults with productivity > 1.0.

1.15) Watersheds targeted by program.

Listed by hydrologic unit code –Yankee Fork Salmon River: 17060201

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

The Tribes have implemented intensive habitat restoration activities and minimized harvest opportunities for Tribal members in the Yankee Fork. Habitat, although degraded within the dredge reach, is not the primary limiting factor for Chinook salmon and adult returns have not increased as a result of habitat enhancement efforts. Harvest opportunities have been limited to complete curtailments in the past to less than three fish in the present. The Tribes habitat and harvest management has little effect on the number of adults that return annually. One obvious candidate to explain the decline in productivity is the increase in the number of dams that smolts

(juvenile downstream migrants) and returning adults must pass to survive and complete their life cycle (e.g., Schaller et al. 1999; Deriso et al. 2001).

Chinook salmon productivity must be greater than 1.0 recruits per spawner. As mentioned above, the current productivity estimate for Yankee Fork is 0.80, far less than replacement. If productivity is not at least at 1.0, then supplementation is considered our only alternative to prevent near-term extinction or avoid further losses of genetic variation. In response to the declining Chinook population in Yankee Fork, the Tribes developed the YFCSS project to increase the number of Chinook salmon returning to Yankee Fork. This decision resulted from a number of factors including: (1) an immediate need to prevent local extinction; (2) a long history of introductions of out-of-basin stocks; (3) an emphasis on achieving the conservation objective of 1,500 adults; (4) the importance of the area as a Tribal subsistence fishery and harvest objective of 500 adults; (5) the proximity of a donor hatchery that could provide broodstock (i.e. Sawtooth) to support an enhancement effort; and (6) the importance of preserving any remaining genetic integrity.

SECTION 2. PROGRAM EFFECTS ON NMFS ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

The YFCSS project currently operates under the Tribes ESA 1127-3R NOAA permit for scientific research, monitor and evaluation. The Tribes have been covered under the LSRCP Section 6 Biological Opinion for Bull Trout. In addition, the Tribes received an IDFG Scientific Collection Permit.

2.2) Provide descriptions, status, and projected take actions and levels for NMFS ESA-listed natural populations in the target area.

2.2.1) Description of NMFS ESA-listed salmonid population(s) affected by the program.

The following excerpts describing the current ESA-listed Snake River spring/summer Chinook salmon population were taken from the Draft Salmon Subbasin Summary prepared for the Northwest Power Planning Council (NPPC 2001).

Salmon Sub-basin

The Salmon Sub-basin lies within the northern Rocky Mountains of central Idaho and encompasses 10 major watersheds. The Salmon River flows 410 miles north and west through central Idaho to join the Snake River in lower Hells Canyon. The Salmon is one of the largest sub-basins in the Columbia River Basin and encompasses some of the most pristine terrestrial and aquatic temperate ecosystems.

The Salmon River sub-basin covers approximately 14 thousand square miles, 16.7 percent of the land area of Idaho. Ten major hydrologic units (watersheds) occur within the sub-basin: the Upper Salmon, Pahsimeroi, Middle Salmon-Panther, Lemhi, Upper Middle Fork Salmon, Lower Middle Fork Salmon, South Fork Salmon, Lower Salmon, and Little Salmon watersheds.

Idaho's stream-type Chinook salmon are truly unique. Smolts leaving their natal rearing areas migrate 700 to 950 miles downstream every spring to reach the Pacific Ocean. Mature adults migrate the same distance upstream, after entering freshwater, to reach their place of birth and spawn. The life history characteristics of spring/summer Chinook are well documented by IDFG et al. 1990; Healey 1991; NMFS: 57 FR 14653 and 58FR68543). Kiefer's (1987) An Annotated Bibliography on Recent Information Concerning Chinook salmon in Idaho, prepared for the Idaho Chapter of the American Fisheries Society provides a reference of information available through the mid-1980s on life history, limiting factors, mitigation efforts, harvest, agency planning, and legal issues. Snake River Spring/Summer Chinook salmon, of which spawning populations in the Salmon River sub-basin is a part, were listed as Threatened under the Endangered Species Act in 1992 (57 FR 14653); critical habitat was designated in 1993 (58 FR 68543).

Recent and ongoing research has provided managers with more specific knowledge of the Salmon River sub-basin stocks. Intensive monitoring of summer parr and juvenile emigrants from nursery streams has provided insights into freshwater rearing and migration behavior (Walters et al. 2001; Achord et al. 2000; Hansen and Lockhart 2001; Nelson and Vogel 2001). Recovered tags and marks on returning adults at hatchery weirs and on spawning grounds have indirectly provided stock specific measures of recruitment and fidelity (Walters et al. 2001; Berggren and Basham 2000). Since 1992, hatchery produced Chinook has been marked to distinguish them from naturally produced fish.

Age-length frequency and age composition of individual stocks are currently being refined for specific stocks (Kiefer et al. 2001). Distribution and abundance of spawning is being monitored with intensity in specific watersheds (Walters et al. 2001; Nelson and Vogel 2001). Ongoing since the mid-1980s, annual standard surveys continue to provide trends in abundance and distribution of summer parr (Hall-Griswold and Petrosky 1997, 2001 in progress). Resultant data show an erratic trend toward lower abundance of juvenile Chinook salmon in their preferred habitat (Rosgen C type channels), both in hatchery influenced streams and in areas serving as wild fish sanctuaries.

Analysis of recent stock-recruitment data (Kiefer et al. 2001) indicates that much of the freshwater spawning/rearing habitat of Snake River Spring/Summer Chinook salmon is still productive. The average production for brood years 1990-1998 was 243 smolts/female. Stock-recruitment data show modestly density-dependent survival for the escapement levels observed in recent years and have been used to estimate smolt-to-adult survival necessary to maintain or rebuild the Chinook populations. A survival rate of 4.0% (this is less than historic levels) would result in an escapement at Lower Granite Dam of approximately 40,000 wild adult spring/summer Chinook salmon.

In the mid-1900s, the Salmon Sub-basin produced an estimated 39% of the spring and 45% of the summer Chinook salmon that returned as adults to the mouth of the Columbia River. Natural escapements approached 100,000 spring and summer Chinook from 1955 to 1960; with total escapements declining to an average of about 49,300 (annual average of 29,300 spring Chinook salmon and 20,000 summer Chinook salmon) during the 1960s.

Smolt production within the Salmon Subbasin is estimated to have ranged from about 1.5 million to 3.4 million fish between 1964 and 1970 (IDFG 1985).

Populations of stream-type (spring and summer) Chinook in the sub-basin have declined drastically and steadily since about 1960. This holds true *despite substantial capacities of watersheds within the sub-basin to produce natural smolts and significant hatchery augmentation of many populations*. For example, counts of spring and summer Chinook redds in IDFG standard survey areas within the sub-basin declined markedly from 1957 to 1999. The total number of spring and summer Chinook redds counted in these areas surveys ranged from 11,704 in 1957 to 166 in 1995 (Elms-Cockrum in press). Stream-type Chinook redds counted in all of the sub-basins monitored spawning areas have averaged only 1,044 since 1980, compared to an average 6,524 before 1970. Land management activities have affected habitat quality for the species in many areas of the sub-basin, but spawner abundance declines have been common to populations in both high-quality and degraded spawning and rearing habitats (IDFG 1998).

Kucera and Blenden (1999) have reported that all five "index populations" (spawning aggregations) of stream-type Chinook in the Salmon Sub-basin, fish that spawn in specific areas of the Middle Fork and South Fork Salmon watersheds, exhibited highly significant ($p<0.01$) declines in abundance during the period 1957-95. NMFS (2000) estimated that the population growth rates (lambda) for these populations during the 1990s were all substantially less than needed for the fish to replace themselves: Poverty Flats (lambda = 0.757), Johnson Creek (0.815), Bear Valley/Elk Creek (0.812), Marsh Creek (0.675), and Sulphur Creek (0.681). Many wild populations of stream-type Chinook in the sub-basin are now at a remnant status and it is likely that there will be complete losses of some spawning populations. Annual redd counts for the index populations have dropped to zero three times in Sulphur Creek and twice in Marsh Creek, and zero counts have been observed in spawning areas elsewhere within the Salmon Sub-basin. All of these Chinook populations are in significant decline, are at low levels of abundance, and at high risk of localized extinction (Oosterhout and Mundy 2001).

Large reductions in historic fisheries on Chinook from the Salmon Sub-basin occurred as populations declined. Historic tribal and recent non-tribal sport fisheries targeted naturally produced salmon. Current fisheries are focused on the harvest of mitigation hatchery-produced fish while attempting to minimize impacts to fish produced in the wild. Sport harvest is now limited to only hatchery produced salmon with an acceptable incidental harvest of naturally produced salmon. Tribal fisheries are still focused in natural-origin origin populations; however harvest is minimal at best.

Yankee Fork Salmon River

The Yankee Fork Salmon River historically supported large runs of anadromous salmonids. The decline of anadromous fish in the Yankee Fork can be linked to the combined effects of downstream hydroelectric developments and local mining activities. The construction of Lower Monumental (1969), Ice Harbor (1962), Little Goose (1970), and Lower Granite (1974) dams on the Snake River, and Bonneville, Dalles, McNary, and John Day dams on the Columbia River, all served to reduce the number of adults returning to the Yankee Fork and the number of smolts successfully migrating to the

ocean. The historic mining activities in the Yankee Fork have further aggravated the tenuous status of Chinook stocks, resulting in further decline.

Yankee Fork, located in Custer County, Idaho, constitutes one of the major tributaries of the upper Salmon River. The Yankee Fork drainage historically supported large runs of anadromous salmonids, primarily spring Chinook salmon and steelhead trout. These runs have been dramatically reduced in the last 20-25 years due to localized mining activities and the effects of downstream hydroelectric developments (Reiser and Ramey 1987). The mining activities have resulted in the complete re-channeling of lower portions of the Yankee Fork and the deposition of extensive unconsolidated dredge piles. Such activities have eliminated or degraded much of the rearing and spawning habitat in the lower Yankee Fork. As a result, the Yankee Fork drainage is grossly underutilized with respect to salmon and steelhead production (Reiser and Ramey 1987).

Chinook destined for the Yankee Fork would enter the Columbia River during March-May, with spawning occurring in August and September (Bjornn 1960). The runs of upper Salmon River spring Chinook, an exceptionally large fish, were found to be comprised of primarily 4-5 year old fish having fork lengths exceeding 32 inches (Bjornn et al 1964). Egg incubation extended into December, with emergence occurring in February or March (Reiser and Ramey 1987). The juveniles would typically rear in freshwater until the spring (March-April) of their second year, generally at a length of 4-5 inches (Bjornn 1960).

Over six percent of the Chinook redds found in the upper Salmon River have been located in the Yankee Fork system (Reiser and Ramey 1987). Chinook redd counts taken in the upper Yankee Fork have ranged from a high of 250 in 1967, to 0 in 1980, 1982, and 1983 (Pollard 1985). For the whole drainage, the number of redds have ranged from over 600 in 1967 to less than 10 in the mid-1980's (Konopacky et al. 1986). Intensive multiple-ground redd counts conducted by the Tribes for the whole drainage from 1986-2005 have averaged 36.9 redds/year (Ray unpublished data).

The large runs of salmon not only afforded a sport fishery for the upper Salmon River but also provided a subsistence and ceremonial fishery for the SBT. The Yankee Fork system in particular is an important and treaty-guaranteed anadromous fishing area for the Tribes and one which has been used for many generations (Reiser and Ramey 1987). The Tribes have volunteered to help with the restoration of anadromous fish by temporarily curtailing salmon fishing in the Yankee Fork, with the exception of bath tub fisheries provided during Pahsimeroi Fish Hatchery management shifting from spring Chinook to summer Chinook during 1985 and 1986.

Identify the NMFS ESA-listed population(s) that will be <u>directly</u> affected by the program

The population directly affected by the YFCSS program is the Yankee Fork Salmon River Chinook distinct population segment.

Identify the NMFS ESA-listed population(s) that may be <u>incidentally</u> affected by the program.

All juvenile and adult Chinook salmon released from the YFCSS occur within the Yankee Fork Salmon River. However, populations that could be affected by the YFCSS adult strays include six extant Chinook salmon populations within the Upper Salmon River MPG. To a lesser extent, Chinook salmon MPGs downstream of the Upper Salmon River MPG potentially could be affected by the YFCSS.

Other ESA listed populations include the Snake River sockeye salmon ESU (listed as endangered in 1991), Snake River Basin steelhead ESU (listed at threatened in 1997) and bull trout (listed as threatened in 1998). In 2009, two adult sockeye salmon were trapped at the Pole Flat Weir, of which one was transported to Sawtooth Fish Hatchery.

2.2.2) Status of NMFS ESA-listed salmonid population(s) affected by the program.

Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds.

The ICTRT classified the Yankee Fork Salmon River population as a "basic" population based on historical habitat potential (ICTRT 2005). A Chinook population classified as basic has a mean minimum abundance threshold criteria of 500 naturally produced spawners with a sufficient intrinsic productivity to achieve a 5% or less risk of extinction over a 100-year timeframe.

Current (1961 to 2003) natural population abundance (number of adults spawning in natural production areas) has ranged from 0 fish in 1995 to 1,488 fish in 1968. Abundance in recent years has been highly variable. The most recent 10-year geomean number of natural spawners was 13 fish (NOAA Draft Recovery Plan). The ICTRT status assessment indicates that the Yankee Fork Salmon River population is at high risk based on current abundance and productivity. The current program management is attempting to address these deficiencies by using a segment of the returning integrated adults to supplement natural spawners above the hatchery weir to increase the abundance of natural spawners. Additionally, if sufficient numbers of integrated adults return, managers will use them to integrate the production component of the program, thereby reducing the effects of domestication when hatchery fish spawn with natural-origin fish in the wild (modeled increase in productivity). A sliding scale will be used to maximize PNI, particularly in years of low natural-origin adult escapement.

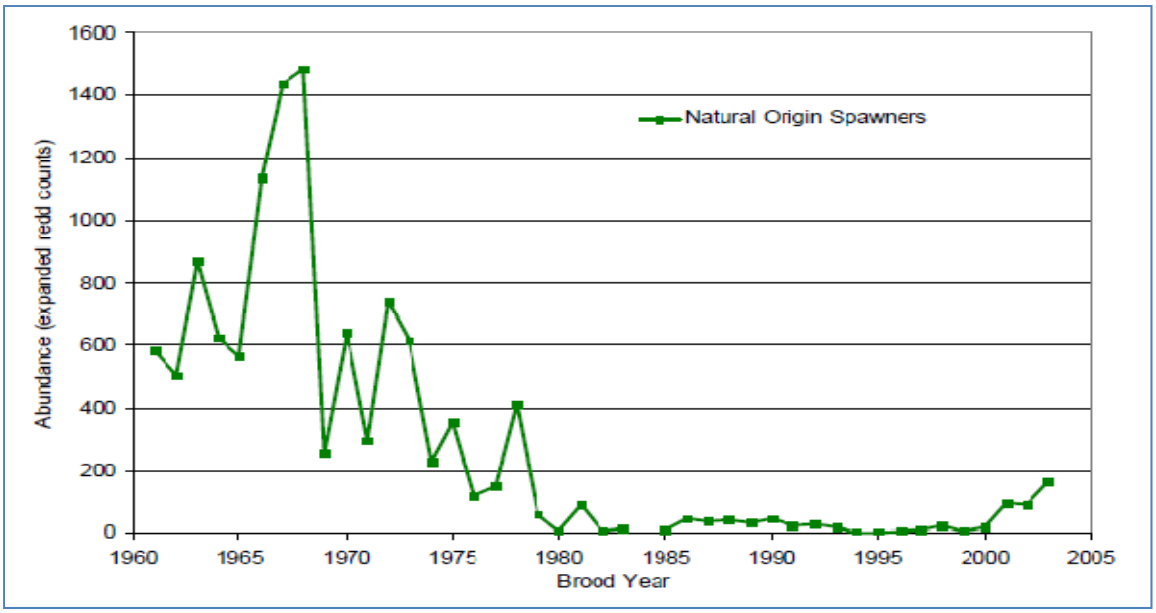

Figure 16. Yankee Fork abundance trends 1961 – 2003.

Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage or other measures of productivity for the listed population. Indicate the source of these data.

Estimates of Yankee Fork Salmon River Chinook abundance and productivity were developed by the ICTRT and are presented below (Table 6).

Table 6. Yankee Fork abundance and productivity measures.

10-year geomean natural abundance	13
20-year return/spawner productivity	0.68
20-year return/spawner productivity, SAR adj. and delimited*	0.80
20-year Bev-Holt fit productivity, SAR adjusted	n/a
20-year Lambda productivity estimate	n/a
Average proportion natural origin spawners (recent 10 years)	1.0
Reproductive success adj. for hatchery origin spawners	n/a

*Delimited productivity excludes any spawner/return pair where the spawner number exceeds 75% of the size category threshold for this population. This approach attempts to remove density dependence effects that may influence the productivity estimate.

Provide the most recent 12-year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Annual spawner abundance and other key population metrics developed by the ICTRT for the Yankee Fork Salmon River population are shown in Table 7 (ICTRT 2005).

Table 7. Yankee Fork Chinook population metrics for brood years 1979-2003.

Brood Year	Spawners	%Wild	Natural Run	Nat. Rtns	R/S	Rel. SAR	Adj. Rtns	Adj. R/S
1979	60	1	60	7	0.12	0.87	6	0.10
1980	4							
1981	90							
1982	2							
1983	15	1	15	41	2.77	0.58	24	1.60
1984								
1985	11	1	11	37	3.26	1.57	57	5.11
1986	45	1	45	35	0.78	1.41	49	1.10
1987	37	1	37	33	0.91	1.83	61	1.66
1988	40	1	40	25	0.61	0.75	18	0.46
1989	30	1	30	23	0.75	1.79	40	1.34
1990	43	1	43	11	0.25	4.65	50	1.16
1991	22	1	22	2	0.07	3.01	5	0.20
1992	29	1	29	3	0.09	1.65	4	0.15
1993	20	1	20	8	0.39	1.61	12	0.62
1994	2							
1995	0							
1996	4							
1997	9	1	9	57	6.64	0.30	17	1.96
1998	21	1	21	101	4.88	0.30	30	1.45
1999	2	1	2					
2000	20	1	20					
2001	95	1	95					
2002	92	1	92					
2003	161	1	161					

Table 8. Yankee Fork abundance trends 1986-2009.

Year	YANKEE FORK REDDS				Estimated Adult Escapement[1]	Estimated Smolt Production[2]
	Upper (Stratum 4 & 5)	Lower (Strata 1-3)	WFYF Strata 6	Total		
1986	NC	35	NC	35	88	8,505
1987	5	4	17	26	65	6,318
1988	2	4	31	37	93	8,991
1989	0	16	6	22	55	5,346
1990	5	2	20	27	68	6,561
1991	9	3	8	20	50	4,860
1992	10	9	6	25	63	6,075
1993	4	11	13	28	70	6,804
1994	0	0	9	9	23	2,187
1995	0	0	0	0	0	0
1996	0	1	7	8	20	1,944
1997	5	7	7	19	48	4,617
1998	1	14	12	27	68	6,561
1999	2	0	0	2	5	486
2000	10	1	4	15	38	3,645
2001	32	50	36[3]	118	295	28,674
2002	21	56	53[4]	130	325	31,590
2003	9	77	24	110	275	26,730

2004	15	13	15 [5]	43	108	10,449
2005	17	6	14 [6]	37	93	8,991
2006	10	5	14 [7]	29	73	7,047
2007	8	7	10 [8]	25	63	6,075
2008	589	64	7	660	1935 [9]	160,380
2009	366	45	3	414	1640 [10]	100,602
TOTAL	**1120**	**430**	**316**	**1866**	**1980**	**453,438**
AVG	***48.7***	***34.4***	***13.7***	***78***	***90***	***18893***

[1] Adult estimates obtained by assuming 2.5 spawners/redd (Matthews and Wapels 1991).

[2] Estimated smolt production determined from Kiefer et al. (2001); average of 243 smolts per redd.

[3] 18 wild/natural and 18 captive rearing from IDFG observations.

[4] 20 wild/natural and 33 captive rearing from IDFG observations.

[5] 4 wild/natural and 11 captive rearing from IDFG observations.

[6] 4wild/natural and 8 captive rearing from IDFG observations.

[7] 6 wild/natural and 8 captive rearing from IDDG observations.

[8] 3 wild/natural and 7 captive rearing from IDFG observations.

[9] Actual count from weir, adult outplanting, mark-recapture, and carcass recovery data.

[10] Actual count from weir, adult outplanting, mark-recapture, and carcass recovery data.

Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.

Numbers of hatchery and natural-origin Chinook salmon released for natural spawning are presented in Table 9. In 1986 IDFG released over 2,000 adult Chinook into the upper Yankee Fork above Fivemile Creek. These adults not only provided the Tribes with a ceremonial spear fishery, but many spawned successfully and contributed to juvenile production. In 2006, 135,934 Chinook salmon smolts of Sawtooth origin where released into Yankee Fork. Prior to 2006, Yankee Fork was supplemented with several stocks including Rapid River, Salmon River, and Pahsimeroi from 1977 to 1994. More recently, management agreement has allowed adult outplants in Yankee Fork above Sawtooth broodstock requirements under the objectives of the YFCSS project. Information from the Salmon Subbasin Plan (1990), Fish Passage Center (2005), and Sawtooth Fish Hatchery Annual Report (1992) is summarized below (Table 9).

Table 9. Yankee Fork Chinook salmon artificial propagation history 1977-2006.

BY	RY	Number	Location	Stock	Size	fish/lb	Hatchery
	1977	56,700	WFYK	Rapid River	fry-fingerling		Mackay
	1978	75,036	Yankee Fork	Rapid River	fry-fingerling		Mackay
	1985	61	Yankee Fork	Sawtooth	adult		Sawtooth
	1985	659	Yankee Fork	Rapid River	adult		Pahsimeroi
	1986	61	Yankee Fork	Sawtooth	adult		Sawtooth
	1986	1,505	Yankee Fork	Rapid River	adult		Pahsimeroi
	1986	386,348	Yankee Fork	Rapid River	fry-fingerling		Pahsimeroi
	1987	157,877	Yankee Fork	Rapid River	fry-fingerling		Sawtooth

	1987	600	Yankee Fork	Rapid River	adult		Pahsimeroi
1986	1987	158,000	Yankee Fork Ponds	Salmon R.	pre-smolt	250	Sawtooth
1986	1988	725,500	Yankee Fork Ponds	Pahsimeroi	smolt	20	Sawtooth
1987	1988	50,100	Yankee Fork Ponds	Rapid River	fry-fingerling	120	Sawtooth
1987	1989	198,200	Yankee Fork Ponds	Salmon R.	smolt	24	Sawtooth
1988	1989	125,000	Yankee Fork Ponds	Salmon R.	fry-fingerling	100	Sawtooth
1988	1990	200,800	Yankee Fork Ponds	Salmon R.	smolt	21	Sawtooth
1989	1990	50,000	Yankee Fork Ponds	Rapid River	fry-fingerling	100	Yakima
1989	1990	491,300	Yankee Fork	Salmon R.	smolt	45	Sawtooth
1989	1990	50,000	Yankee Fork Ponds	Salmon R.	fry-fingerling	111	Sawtooth
1990	1991	50,000	Yankee Fork Ponds	Rapid River	fry-fingerling	120	Sawtooth
	1994	25,025	WFYF	Sawtooth	smolt		Sawtooth
2004	2006	135,934	Yankee Fork	Sawtooth	smolt	21.3	Sawtooth
2008	2008	1,438	Yankee Fork	Upper Salmon	adult		Sawtooth
2009	2009	1,517	Yankee Fork	Upper Salmon	adult		Sawtooth

2.2.3) Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of NMFS listed fish in the target area, and provide estimated annual levels of take.

Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the take may occur, the risk potential for their occurrence, and the likely effects of the take.

Broodstock collection will result in the direct take of ESA-listed Snake River spring/summer Chinook salmon. There is the possibility that steelhead or bull trout may be incidentally captured at the Yankee Fork weir. Non-target captured individuals will be immediately released either upstream or downstream of the weir with minimal handling.

The Tribes developed a monitoring and evaluation (M&E) plan to assess the success of hatchery supplementation activities in the Yankee Fork Salmon River. Monitoring and evaluation of Chinook salmon will occur by fin clips for genetic analysis, a non-lethal method of data collection. DNA typing will be used to differentiate Chinook salmon of hatchery-origin or natural-origin. Additional M&E activities will include creel surveys, redd counts, and carcass recoveries.

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

IDFG has spawned three broodyears of Chinook salmon for the YFCSS project. The first release of smolts occurred in 2006 and adults were collected for broodstock in 2004. Adult broodstock for the YFCSS was not collected with broodyears 2005 – 2007. In broodyear 2008 and 2009, IDFG has collected broodstock to produce 400,000 smolts. In addition, 450,000 eyed eggs were outplanted in Yankee Fork in 2009. Adults for the eyed egg outplants were collected at Sawtooth.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

All adult Chinook salmon are trapped and handled at the Yankee Fork weirs. The number of returning hatchery and natural-origin adults varies annually. In 2008, 185 hatchery and 43 natural-origin Chinook salmon were trapped at Pole Flat weir, with no fish trapped at Five Mile weir. In 2009, 20 hatchery and 29 natural-origin Chinook salmon were trapped at Pole Flat weir. Three of the 29 natural-origin Chinook salmon were trapped again at Five Mile weir. One hatchery fish was trapped at Five Mile weir in 2009.

To meet the juvenile release objective while operating in conjunction with Sawtooth the Tribes plan to collect up to 120 adults or 60 pairs. We estimate pre-spawn mortality to be eight percent or 10 adults, so 55 pairs of adults will be spawned for the program. To collect broodstock from the entire Chinook salmon run, all adult Chinook salmon entering Yankee Fork will be trapped at Pole Flat weir and/or Five Mile weir. Of the 200,000 juveniles scheduled for release, we estimate 36,500 juveniles or eggs will not survive to the release stage. Once Crystal Spring FH is up and running the number of adults broodstock will increase to 400 adults or 200 pairs.

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

It is unlikely that take levels for natural-origin Chinook salmon will exceed projected take levels presented in Table 16. If adult collection exceeds broodstock take levels, those individuals not required for the YFCSS will be released upstream of the Yankee Fork weir for natural spawning. However, in the unlikely event that stated levels of take are exceeded, the Tribes will consult with NOAA-Fisheries Sustainable Fisheries Division to agree to an action plan.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted

policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

The YFCSS project conforms to the plans and policies of the LSRCP administered by the U.S. Fish and Wildlife Service to mitigate for the loss of Chinook salmon production caused by the construction and operation of the four dams on the lower Snake River. In addition, the Tribes have developed the YFCSS to assist with the recovery of the Upper Salmon Major Population Group as described by the Interior-Columbia Technical Recovery Team. The YFCSS will also assist in meeting the objectives of the Salmon Sub-basin Plan (Ecovista 2004) and the Council's Fish and Wildlife Program funded by BPA.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

- Shoshone-Bannock Tribes Salmon River Production Program Master Plan - draft
- Shoshone-Bannock Tribes Tribal Resource Management Plan for Snake River spring/summer Chinook salmon fisheries in the Salmon River sub-basin.
- Cooperative Agreement between the U.S. Fish and Wildlife Service and the Shoshone-Bannock Tribes, USFWS Agreement No.: 14110-A-J015 (2010 cooperative agreement number for YFCSS project).
- 2008 - 2017 Management Agreement pursuant to *U.S. v Oregon*, U.S. District Court, District of Oregon.
- Tribes, IDFG, and LSRCP Memorandum of Agreement (2008 and 2009)

Description of cooperating agencies and programs:

Shoshone-Bannock Tribes

Lower Snake River Compensation Plan (LSRCP)

The LSCRP was authorized by Congress in 1976. Its purpose is to mitigate for losses of adult Chinook salmon and steelhead, along with angling days for resident species due to the construction and operation of four dams on the lower Snake River.

The goals of the LSRCP are to return 55,100 adult steelhead and 58,700 adult spring and summer Chinook salmon above Lower Granite Dam, along with returning 18,300 adult fall Chinook salmon above Ice Harbor Dam. To mitigate lost angler days for resident species, the LSRCP program stocks 86,000 pounds of trout into inland lakes and ponds close to the project area. Many LSRCP programs emphasize conservation of salmon and steelhead.

Sawtooth Fish Hatchery is a LSRCP program initiated to mitigate for spring Chinook losses caused by the four federal dams constructed on the lower Snake River. The goal of the Sawtooth is to return approximately 19,445 adult spring Chinook salmon above Lower Granite. Sawtooth was constructed in 1985 with production targets of 1.3 million smolts for release in the Salmon River, 700,000 into the East Fork Salmon River, and 300,000 smolts for release into Valley Creek.

Idaho Department of Fish and Game (IDFG)

IDFG is a co-manager with the YFCSS project and operator of Sawtooth Fish Hatchery and East Fork Satellite. Sawtooth will provide egg incubation and juvenile rearing facilities for the YFCSS. East Fork Satellite will be used to hold adult broodstock until an adult holding facility is constructed on Yankee Fork.

Snake River Salmon and Steelhead Recovery Plan

NOAA-Fisheries developed the draft Snake River Salmon and Steelhead Recovery Plan. The goal of the plan is to restore the health of the Columbia and Snake River ecosystem and to recover listed Snake River salmon and steelhead stocks. Two major actions include improving environmental factors associated with reducing stocks and rebuilding populations to an level to provide sustainable fisheries. In order to rectify the latter, an improvement in smolt emigration and adult immigration into Yankee Fork is necessary.

Snake River Sub-Basin Plan

Under the Northwest Power Planning Council (NPPC), a sub-basin plan was developed for the Salmon River. This plan documents current and potential salmon and steelhead production, summarizes goals and objectives, and provides proper management strategies. The NPPC created the System Planning Group (SPG) and the Monitor and Evaluation Group (MEG) to document habitat quality and potential smolt capacity for regions within the sub-basin. The YFCSS will increase adult returns which is an objective of the plan.

Columbia River Fish Management Plan (CRFMP)

The Columbia River Fish Management Plan (CRFMP) is a court approved settlement between the parties in *U.S. v Oregon*, a case addressing treaty fishing rights in the Columbia River basin. The signatories to the settlement are the United States of America acting through the Department of the Interior and the Department of Commerce; the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian reservation; the Confederated Tribes of the Warm Springs Reservation of Oregon; the Confederated Tribes and bands of the Yakama Nation; the Shoshone-Bannock Tribes and the states of Oregon, Washington, and Idaho. The plan is a framework for these parties to protect, rebuild, and enhance Columbia River Fish runs while providing fish for both treaty Indian and non-Indian fisheries. The agreement establishes procedures to facilitate communication and resolve disputes through a Policy Committee composed of the parties. Two technical committees guide management decisions of the Policy Committee. The Production Advisory Committee (PAC) responds to hatchery production issues; the Technical Advisory Committee (TAC) responds to harvest issues.

Since the escapement goals for salmon to the Snake River basin are viewed as hard constraints on harvest by the regulators within the Columbia River basin, the nature of these goals is critical to the sustainable management of all salmon and steelhead. Although the Yankee Fork Chinook is part of an aggregate escapement goal for areas above Lower Granite Dam, the CRFMP has no explicit escapement goal for Yankee Fork.

The Tribes as a CRFMP signatory, will be responsible for consultation with the other parties to CRFMP to ensure that hatchery management and operations are in compliance with the CRFMP with regard to production issues, harvest in the ocean and mainstem Columbia River and harvest in the Salmon River in Idaho.

3.3) Relationship to harvest objectives.

To the extent consistent with the conservation and broodstock objectives of the YFCSS program, contribute to the Yankee Fork, Salmon, Snake, and Columbia River fisheries.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Harvest opportunities in Yankee Fork will be available to Tribal members and will be governed by the Shoshone-Bannock Tribes' Tribal Resource Management Plan. Hatchery-produced adults will be subjected to potential Commercial Ocean and in-river fisheries with a sport fishing season. Since the inception of the LSRCP, Chinook salmon sport fishing seasons have been limited in the upper Salmon River.

3.4) Relationship to habitat protection and recovery strategies.

The decline of anadromous fish in the Yankee Fork can be linked to hydropower developments and mining activities. Mining has resulted in complete re-channeling of lower Yankee Fork and deposition of extensive dredge piles and, thus, has eliminated or destroyed significant amounts of excellent rearing and spawning habitat (Reiser and Ramey 1987). Without habitat enhancement, production of salmon and steelhead will remain below historic levels. In addition to habitat enhancement, significant changes in hydropower operation must be adopted to increase survival of Yankee Fork Chinook salmon.

Currently, the NOAA-Fisheries is developing a recovery plan specific to the Snake River spring/summer Chinook salmon ESU. YFCSS will assist NOAA-Fisheries in achieving recovery objectives for Yankee Fork Chinook.

3.5) Ecological interactions.

Possible negative effects on listed salmon from the release of hatchery-produced Chinook smolts may occur through predation, competition, or disease transmission.

Predation

It may be probable, although highly unlikely, that hatchery-origin juveniles from the YFCSS may prey on natural-origin spring Chinook. Although it is possible for hatchery-origin individuals to ingest natural-origin fry based on size (39.8 mm; Peery and Bjornn 1992), emigration from release sites is expected to occur almost immediately alleviating any pressure to natural-origin fish. In addition, no studies suggest juvenile Chinook salmon are piscivorous as well as it is unlikely hatchery-origin individuals will convert to a natural diet immediately upon release (USFWS 1992, 1993).

Competition

Initial competition in Yankee Fork should be minimal due to the limited population size of natural Chinook salmon and steelhead trout in the system. Competition for food and space should also be minimal because of the location of selected release sites, rapid emigration from those, and the initial non-natural diet of hatchery-produced juveniles. Space and habitat selection should be controlled by the size difference between hatchery and natural-origin juveniles (Everest 1962). Generally, hatchery-produced juveniles are larger and, therefore, more adapted to occupy deeper water and faster velocities compared to smaller, natural juveniles (Hampton 1988).

Disease

There is history of chronic bacterial disease (BKD) in spring Chinook salmon from Sawtooth. Sawtooth has installed adult antibiotic injections, egg disinfection, egg culling based on BKD ELISA values, egg segregation incubation, juvenile segregation rearing, and juvenile antibiotic feedings as disease control measures (SFH HGMP 2002). Sawtooth and the YFCSS will monitor the health status of hatchery-produced Chinook salmon and follow protocols established by the PNFHPC and AFS Health Section.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Sawtooth Fish Hatchery

The Sawtooth Fish Hatchery receives water from the Salmon River and from five wells. River water enters an intake structure located approximately 0.8 km upstream of the hatchery facility. River water intake screens comply with NMFS criteria. River water flows from the collection site to a control box located in the hatchery building where it is screened to remove fine debris. River water can be distributed to indoor vats, outside raceways, or adult holding raceways. The hatchery water right for river water use is approximately 60 cfs. Incubation and early rearing water needs are met by three primary wells. A fourth well provides tempering water to control the build-up of ice on the river water intake during winter months. The fifth well provides domestic water for the facility. The hatchery water right for well water is approximately 9 cfs. River water temperatures range from 0.0ºC in the winter to 20.0ºC in the summer. Well water temperatures range from 3.9ºC in the winter to 11.1ºC in the summer.

Yankee Fork weirs

The Yankee Fork weirs do not divert any water from Yankee Fork. No fish rearing occurs at this site.

East Fork Salmon River Satellite

The East Fork Salmon River Satellite receives water from the East Fork Salmon River. Approximately 15 cfs is delivered to the facility through a gravity line. Water is delivered to adult holding raceways. A well provides domestic water and pathogen-free supply for spawning (egg water-hardening process). No fish rearing occurs at this site. The intake screens comply with NMFS screen criteria and were designed by the Corp of Engineers.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Intake screens at all facilities will comply with NOAA-Fisheries screen criteria and were designed by the Corps of Engineers. IDFG monitors and maintains Sawtooth 24 hours a day and is responsible for emergency actions. The YFCSS will be monitored and occupied 24 hours a day. The East Fork Satellite Facility will be monitored by the Tribes and IDFG.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Pole Flat Weir
Adult collection at the Pole Flat weir is facilitated by a temporary weir that spans the Yankee Fork Salmon River. Weir panels and the trapping device are installed in late June or early July to prevent upstream migration of adult Chinook salmon. Chinook salmon volitionally migrate into the adult trap where they are manually sorted and disposition is determined.

Five Mile Weir
Adult collection at the Five Flat weir is facilitated by a temporary weir that spans the Yankee Fork Salmon River. Weir panels and the trapping device are installed in late June or early July to prevent upstream migration of adult Chinook salmon. Chinook salmon volitionally migrate into the adult trap where they are manually sorted and disposition is determined.

Sawtooth Fish Hatchery
Adult collection at the Sawtooth Fish Hatchery is facilitated by a permanent weir that spans the Salmon River. Weir panels are installed to prevent the upstream migration of adult Chinook salmon. Fish volitionally migrate into the adult trap where they are manually sorted into adult holding raceways. The hatchery has three 167 ft long x 16 ft wide x 5 ft deep holding raceways and an enclosed spawning building. Each raceway has the capacity to hold approximately 1,300 adults.

East Fork Salmon River Satellite
The East Fork Salmon River Satellite was constructed with a velocity barrier fitted with radial gates to prevent upstream passage beyond the trap. Adult Chinook salmon move into a fish ladder and then into two adult holding raceways that measure 68 ft long by 10 ft wide by 4.5 ft deep. Each adult pond has the capacity to hold approximately 500 adults.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

A variety of transportation vehicles and equipment are available at the various facilities.

Smolt
Multiple methods are available for smolt transfer: two-ton trucks, helicopters, or tanker trucks. Two-ton trucks would require numerous truck loads and helicopter releases are not viable for large releases. Tanker trucks are considered the favorable approach for smolt transfer to Yankee Fork. Transportation of smolt will be conducted using a 5,000 gallon capacity tanker truck. Five

tanks of 1,000 gallons with 6°C water and fish size of 20 FPP can safely hold 26,112 smolts per tank for a total of 130,560 smolts per load. Three trips would safely stock approximately 391,680 smolts. Distance from Sawtooth to the stocking site is approximately 26 miles. Safe travel time would be one hour, dependent on road conditions. Smolt loading will occur at Sawtooth at 8:30 a.m. during winter weather conditions, therefore, estimating completion of one stocking trip (Sawtooth to Sawtooth) by 11:00 a.m.

Adult
Adults are transported using a 300 gallon tank mounted on a three-quarter ton truck. The tank has one compartment of 300 gallon capacity and was modified to include an oxygen tank, diffuser, and circulating pump. The tank is filled with water pumped directly from Yankee Fork. Normal hauling guidelines were followed for adult fish, which is approximately one pound of fish per gallon of water.

Eggs
Eggs will be placed in individual containers to maintain separation from other female eggs. Containers will be placed in 80 quart sealed, insulated coolers for transportation. Ice is added to each cooler to keep eggs chilled during transport.

5.3) Broodstock holding and spawning facilities.

Section 5.1 describes the trapping, broostock holding, and spawning facilities.

5.4) Incubation facilities.

Incubation of YFCSS progeny will occur at Sawtooth Fish Hatchery.

Sawtooth Fish Hatchery
Incubation facilities at the Sawtooth Fish Hatchery consist of a well water-supplied system of 100 stacks of incubator frames containing 800 incubation trays. The maximum incubation capacity at the Sawtooth Fish Hatchery is 5 million Chinook eggs.

East Fork Salmon River Satellite
Spawning of YFCSS broodstock occurs at the East Fork Satellite but no incubation occurs at this facility. Eggs are transferred to the Sawtooth Fish Hatchery for incubation.

5.5) Rearing facilities.

Rearing of YFCSS progeny will occur at Sawtooth Fish Hatchery.

Inside Rearing
Inside rearing is provided to rear newly hatched juveniles to the fry stage. Inside rearing consists of three semi-square tanks with an individual volume of 17 cubic feet and a capacity of 15,000 swim up fry each; four inside rearing tanks with an individual volume of 90 cubic feet and a capacity for 50,000 fry each; and 14 inside rearing vats with an individual volume of 391 cubic feet and a capacity of 100,000 fry each. Inside rearing capacity equals 1,545,000 fry, however there are six additional fry raceways each with 1,500 cubic feet of rearing space.

Outside Rearing

Outside rearing is provided to rear fry to smolt, however as mentioned above there are 12 fry raceways. Sawtooth has 14 production raceways each with 5,400 cubic feet of rearing space. Both outside fry and production raceways have the capability of being split. Each production raceway has a capacity to raise 200,000 Chinook fry to the smolt stage for a total design capacity of 2.8 million smolt.

5.6) Acclimation/release facilities.

Acclimation facilities for the YFCSS have not been constructed. Pond Series 1 will be used as an acclimation site, with some modifications. The Tribes plan to release Chinook salmon smolts in the mainstem Yankee Fork near Jordan Creek or in the Pond Series (Table 2). The site below Jordan Creek was used to release BY04 Chinook salmon smolts and significant adults returned, indicating successful imprinting. Pond Series 1 and 4 have been used to release BY01 – 08 summer steelhead smolts and adults have successfully returned from these release points. The Tribes will experiment with direct stream vs. partial acclimation releases to determine whether acclimation is necessary. We plan to release 50% of the smolts in the stream and 50% in Pond Series 1 for a period of four generations or until enough information is acquired to determine the best management strategy.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

There has been no significant fish mortality associated with the YFCSS project.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Sawtooth Fish Hatchery

Sawtooth Fish Hatchery is staffed around the clock and equipped with an all-purpose alarm system. Generators are in place for emergency water supply. The inside vat room can be switched to gravity flow with river water in the event of a generator failure. Appropriate protocols are in place for emergency situations and methods for disinfection.

East Fork Salmon River Satellite

The East Fork Satellite will be staffed with either IDFG or Tribal personnel. The adult holding ponds are fed with direct stream water and the intake will be cleaned on a daily basis to ensure proper function.

Pole Flat and Five Mile Weirs

The Tribes will staff employees in Yankee Fork to ensure safe operations for adult Chinook salmon. Adults will be sorted daily as early as 9:00 am when the sun rises above the eastern mountains and daily migration is slowed.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

The YFCSS project has integrated broodstock from Sawtooth Fish Hatchery with natural-origin Chinook salmon in the Yankee Fork. In BY08-09, broodstock was collected at Sawtooth to achieve the smolt release target of 400,000 smolts. In BY10 and beyond, broodstock will be collected at either Yankee Fork or Sawtooth, depending upon adult returns. If sufficient numbers of natural-origin adults return to Yankee in 2010, then natural-origin Yankee Fork adults will be collected for broodstock. Beginning in broodyear 2012 and then after, broodstock collection with transition to the integrated Yankee Fork source and no adults will be collected for broodstock at Sawtooth.

Since the initial phase of the supplementation program is using Sawtooth stock Chinook salmon, it is important to describe the stocks origin. Prior to the completion of construction of the Sawtooth Fish Hatchery in 1985, Chinook salmon smolts were periodically released in the vicinity of the present hatchery (first records date from 1966). While locally returning adults were used as much as possible, juveniles were released from adults sourced at Rapid River Fish Hatchery, Hayden Creek Fish Hatchery (Lemhi River tributary), and Marion Forks Fish Hatchery (Oregon) in 1967 (Bowles and Leitzinger 1991). During the 1970s, several releases into the rearing pond from Rapid River stock were made. Bowles and Leitzinger (1991) note that adult returns from these releases were negligible. The original brood source for the Sawtooth Hatchery program came from adults captured at a temporary weir operated from 1981-1984 at the site of the current hatchery location. Brood year 1985 was the first year that all adult trapping, incubation and rearing occurred at the Sawtooth Fish Hatchery.

6.2) Supporting information.

6.2.1) History.

Yankee Fork Salmon River is located within the boundaries of the Salmon-Challis National Forest in Custer County, Idaho. Yankee Fork is a fourth field HUC watershed and a major tributary of the Salmon River.

Historically, the Yankee Fork drainage was a main supply source of anadromous fish, composed primarily of Chinook salmon and steelhead trout. Runs of these species have been drastically reduced due to a combination of downstream hydroelectric developments and localized mining activities (Reiser and Ramey 1987). Mining has resulted in stream re-channeling, deposition of extensive amounts of dredge piles, and degraded rearing and spawning habitat in lower Yankee Fork.

Generally, spring Chinook would historically enter the Columbia River during March – May and spawn in the Yankee Fork in August and September (Bjornn 1960). Currently, the diminished run of Chinook salmon in the upper Salmon River and Yankee Fork has dramatically reduced an important subsistence and ceremonial fishery for the Shoshone-Bannock Tribes.

Redd counts have consistently declined from a high of 600 for the whole drainage in 1967 (Konopacky et al. 1986). In the mid-1980's, redd counts were zero for upper Yankee Fork (Pollard 1985) and 10 for the entire region (Konopacky et al. 1986). From

2000 – 2004, redd counts averaged 80 per year (Ray unpublished data) resulting in only 200 estimated adults (2.5 spawners/redd) and 48,600 estimated smolts (243 smolts/redd).

6.2.2) Annual size.

Approximately 60 pairs of returning Chinook salmon are needed to meet the current production objective of releasing 200,000 yearling smolts into the Yankee Fork Salmon River. Should Crystal Springs Fish Hatchery become operational, the size of the smolt release will be re-visted.

6.2.3) Past and proposed level of natural fish in broodstock.

There have been no broodstock collected for the YFCSS program in the Yankee Fork to date. In 2008 and 2009, the Tribes and IDFG planned to collect broodstock from the Yankee Fork, however enough hatchery adults were trapped at Sawooth Fish Hatchery to meet the smolt release targets and adults collected in the Yankee Fork were released for natural spawning. Once we achieve an integrated broodstock in BY12, the Tribes will collect natural-origin adults and manage PNI above 30%.

6.2.4) Genetic or ecological differences.

Annual hatchery-produced populations and source populations are genetically similar. Since YFCSS broodstock will be obtained at the Yankee Fork weir, there should not be any genetic or ecological differences in populations.

6.2.5) Reasons for choosing.

The upper Salmon River endemic spring Chinook stock was selected for the YFCSS program. This population is available and poses the least amount of risk to other upper Salmon River stocks.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Artificial selection is difficult to avoid while restoring a diminished natural population. Pending returning run sizes, goals are in place to manage broodstock collection and mainstem spawning populations for 0.3 PNI.

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adults

General production adults (hatchery x hatchery) will be released for natural spawning as well as collected at Sawtooth Fish Hatchery for smolt production to be released in Yankee Fork in BY 08-11. Once integrated adults return to Yankee Fork in 2012, adult crosses (wild x wild; wild x

hatchery) will be spawned to produce a 200,000 smolt release into the Yankee Fork Salmon River.

7.2) Collection or sampling design.

Adults captured at the weir will be sampled and information will be recorded: time, date, location, length, gender, origin, marks, and tags. Broodstock will be randomly collected throughout the entire run to alleviate artificial selection. Guidelines for sampling are as follows:

1.) Weir installed yearly at earliest possible safe flow levels.

2.) Adequate personnel will be present at all times for proper weir and trap operation.

3.) Broodstock collected over entire run.

4.) 60 pairs collected dependent upon SAR average.

5.) Natural fish take priority to spawn upstream.

6.) NOR individuals take first priority for broodstock.

7.) HOR individuals comprise remaining broodstock levels.

8.) Surplus H x W adults released to spawn naturally.

9.) Adults sampled for DNA typing and parentage analysis.

7.3) Identity.

Only one spring Chinook salmon population is recognized in Yankee Fork. Hatchery produced adults will be identified by PIT tags, coded-wire tag, or tissue sampling. Adults without marks will be deemed NOR.

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):
Approximately 60 female and 60 male spring Chinook salmon are needed annually to achieve a smolt release objective of 200,000 smolts and 600 returning adults.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

No broodstock from Yankee Fork has been collected under the YFCSS program. Sawtooth FH broodstock was used to produce 135,934 smolts for release in 2006 into Yankee Fork. Broodyear 2008 and 2009 Sawtooth FH origin adults were outplanted in upper Yankee Fork for natural spawning.

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

Up to 1,500 hatchery-origin fish will be released above the Yankee Fork weir for natural spawning in years 2008 – 2011. All collected fish in excess of the number required for broodstock purposes will be immediately released above the Yankee Fork weir for natural spawning.

7.6) Fish transportation and holding methods.

In the interim, the YFCSS project will depend on transporting adult spring Chinook salmon from Yankee Fork weir to 1) East Fork Salmon River satellite facility or 2) SFH adult holding facility. Adults are transported using a 300 gallon tank mounted on a three-quarter ton truck. The tank has one compartment of 300 gallon capacity and was modified to include an oxygen tank, diffuser, and circulating pump. The tank is filled with water pumped directly from Yankee Fork. Normal hauling guidelines were followed for adult fish, which is approximately one pound of fish per gallon of water. Long-term adult holding and spawning facilities will be designed for location in Yankee Fork. Smolt transfer from SFH to Yankee Fork will occur by tanker truck transportation.

7.7) Describe fish health maintenance and sanitation procedures applied.

YFCSS fish health maintenance, monitoring, disease control, and sanitation will conform to the protocols and procedures of the Sawtooth Fish Hatchery under the Idaho Department of Fish and Game.

Adults
Adults will initially be inspected for any external fungi, which is a possible sign of ectoparasitic infestation. Samples for viral, bacterial, and parasitic disease agents will be taken at spawning. Viral assays are conducted on ovarian fluid and kidney samples from a number of spawned females characteristic of the broodstock are analyzed in bacterial assays. Whirling disease will be tested for by obtaining head wedges from a proportion of the spawning broodstock.

Eggs
After fertilization and before being placed in incubation trays, eggs are rinsed in pathogen free water and cleansed with a 100 parts per million (ppm) buffered iodophor solution for one hour.

Pre-spawn Mortalities
Necropsies are conducted based on the guidelines by the Idaho Department of Fish and Game.

7.8) Disposition of carcasses.

Adult holdings will be checked once an hour 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. Mortalities will then be spread across the spawning habitat to help replenish depleted marine nutrients in the system.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Broodstock collection for the YFCSS program will comply with an issued ESA section 10 permit, IDFG, and mitigation and supplementation guidelines and goals. Natural spawning production and escapement will take priority over hatchery broodstock retention. For any returning run size, there will be a minimum number of adults released above the weir for natural spawning. Disease transfer will be controlled by a systematic health monitoring and evaluation program for all age classes used in the YFCSS.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

Three groups of Chinook salmon will be collected at the YFCSS weir: NOR, NOR/HOR, and HOR. Naturally spawned adults will not be marked. Supplementation adults (NOR/HOR) will be PIT tagged and/or coded-wire tagged. General production fish will also be PIT tagged and/or coded-wire tagged. Fish will be classified into one of the groups and numbered based on capture order. Broodstock will be collected in pairs to maintain a 1:1 spawning ratio of males to females. Coded-wire tag identification or genetic sampling can determine individual relatedness to limit artificial selection and maximize genetic variability by mating unrelated fish.

8.2) Males.

Males will only be spawned once. In cases of unequal broodstock collection, male holding mortality exceeds female, or late male maturation, males may be spawned twice.

8.3) Fertilization.

Spawning will occur by single pair mating (1:1 male to female spawning). Backup males will be retained to ensure fertilization. Excess males will be held over for the next spawning date or be segregated for gamete cyropreservation.

8.4) Cryopreserved gametes.

The Tribes strive to ensure availability of a representative genetic sample of original male population by establishing and maintaining a germplasm repository. Gamete cryopreservation permits the creation of a genetic repository, but is not a cure for decreasing fish stock problems. Gamete samples will be collected and shipped to storage facilities for genetic processing within 24 hours.

Milt will be cryopreserved from transported broodstock NOR males for future spawning. Also, milt will be cryopreserved from adults captured during the second peak (assuming there is a bi-modal distribution) of migration when spawning is occurring.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

Single pair mating will limit apparent artificial selection by randomly selecting a male to fertilize a "ripe" female. Random backup males will be present to ensure fertilization and also increase genetic diversity through potential use of multiple males. Disease control mechanisms are in place to limit the incidence of BKD and fungus related mortality. In addition, cryopreserved milt will be used to maximize NOR genetic diversity in YFCSS program.

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

YFCSS integrated broodstock has not been collected and, consequently, survival rates between life stages have yet to be determined. The YFCSS program anticipates survival rates to be similar to those at SFH. SFH green-egg to eyed-egg survival for broodyears 1986 – 2003 is reported below in Table 11 (SFH Reports 1986-03).

Table 10. Sawtooth Fish Hatchery gamete survival for broodyears 1986-2003 (SFH Reports 1986-2003).

Broodyear	Green Eggs Taken	Eyed-eggs	Survival to Eyed Stage (%)
1986	2,035,535	1,870,306	91.9
1987	2,721,399	2,533,640	93.1
1988	3,120,669	2,846,235	93.1
1989	733,365	668,373	91.1
1990	1,431,360	1,346,350	94.1
1991	922,000	794,800	86.2
1992	468,300	423,600	90.5
1993	369,340	341,641	92.5
1994	29,933	26,232	87.6
1995	7,377	4,977	68.0
1996	51,743	45,128	87.0
1997	260,480	231,827	89.0
1998	139,469	129,593	93.0
1999	63,642	59,373	93.3
2000	454,355	420,733	92.6
2001	1,529,051	1,371,733	89.7
2002	1,037,558	920,651	88.7
2003	174,575	145,744	83.5

9.1.2) Cause for, and disposition of surplus egg takes.

The YFCSS does not consider excess amounts of eggs, parr, or smolts as useless/expendable "surplus." Excess eggs, parr, or smolts will be outplanted in Yankee Fork if survival rates are exceeded between life stages or fecundity is elevated.

9.1.3) Loading densities applied during incubation.

Eight trays will be used per stack of vertical incubation units. Flows to each eight tray stack will be between five to six gallons per minute (gpm). Trays will be loaded with eggs (3,000 – 5,000) from only one female.

9.1.4) Incubation conditions.

Incubation for the YFCSS will occur at the Sawtooth Fish Hatchery. During all incubation periods and processes, pathogen-free well water is used. Catch basins are in place to eliminate the accumulation of silt and sand within the trays. After 48 hours, formalin treatments (1667 ppm) are issued three times per week to control fungal contamination and are discontinued when eggs reach eye-up. Eyed egg stage is generally reached at 560 FTUs at which eggs are then shocked to locate and remove dead or unfertilized eggs.

9.1.5) Ponding.

Ponding occurs once majority of fish reach swim-up stage at approximately 1,650 FTUs.

9.1.6) Fish health maintenance and monitoring.

Eggs will be treated with a formalin solution (1667 ppm) three times per week to control fungal growth. Formalin treatments will be administered until the eggs reach the eyed-up stage. Shocking will be conducted around 560 FTUs. Dead and undeveloped eggs will be removed by an automatic egg picking machine. Good eggs will be electronically counted and returned to the same tray and stack location. Additional egg picks are conducted to remove any uncollected dead eggs. Tray lids and screens will be cleaned during each egg picking event.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

No adverse genetic or ecological effects to listed fish are expected. Density dependent mortality and disease transmission will be countered by placing female eggs in separate trays. Eggs are treated with formalin (1667 ppm) and water hardened in a 100 ppm Iodophor solution for 30 minutes following fertilization. Alarms and sensors are in place for low pressure and water levels.

9.2) Rearing:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

YFCSS program rearing will occur at the SFH. The YFCSS program expects rearing survival data to be similar to those of SFH. Rearing conditions for the YFCSS will be equivalent to natural conditions so there is no advantage for either wild or hatchery-produced juveniles. Survival data is presented below in Table 12 (SFH Reports 1986 – 03).

Table 11. Sawtooth Fish Hatchery gamete rearing efficiency for 1986-2003.

BY	Eyed-Eggs	Ponded Fry	% Survival from Eye	Smolts Released	% Survival from Eyed to Release
1986	1,870,306	1,821,872	97.4	1,705,500	91.2
1987	2,533,640	2,487,500	98.2	2,338,244	92.3
1988	2,846,235	2,818,312	99.0	2,541,500	89.3
1989	668,373	667,900	99.9	652,600	97.6
1990	1,346,350	1,316,048	97.7	1,273,400	94.6
1991	794,800	793,908	99.9	774,583	97.5
1992	423,600	441,812	NA	213,830	50.5
1993	341,641	341,252	99.9	334,313	97.9
1994	26,232	25,632	97.7	25,006	95.3
1995	4,997	4,914	98.3	4,756	95.2
1996	45,128	44,600	98.8	43,161	95.6
1997	231,827	228,997	98.8	223,240	96.3
1998	129,593	127,064	98.0	123,425	95.2
1999	59,373	59,111	99.6	57,134	96.2
2000	420,733	402,777	95.7	385,761	91.7
2001	1,371,133	1,213,215	88.5	1,105,169	80.6
2002	920,651	879,040	95.5	821,415	89.2
2003	145,744	136,830	93.9	134,769	92.5

9.2.2) Density and loading criteria (goals and actual levels).

Following the conclusions of Piper et al. (1982) and operations at Sawtooth Fish Hatchery, density and flow indices are monitored to never exceed 0.30 and 1.5, respectively.

9.2.3) Fish rearing conditions

Swim-up fry are transferred to vats around 1,650 FTUs. Flows range between 20 and 110 gpm, increasing as fish grow. Water temperature ranges from 4.4 to 7.8°C and is supplied from pathogen-free wells. Outside raceways are supplied with river water ranging from 1.1 to 16.0°C. Spring Chinook are relocated outside at approximately 7.6 mm. Flows and raceway size sections are proportionately increased as fish grow.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Average length, mass, fish/pound, and condition factor for Chinook salmon at ponding, vat to raceway, and release is presented in Table 13. Length, mass, and condition factor are calculated from the fish per pound value.

Table 12. Average size by period for Chinook salmon reared at SFH.

Time Period	Length (mm)	Mass (g)	Fish/lb	Condition Factor
Ponding	35	1.27	1,200	3.00
Vat to Raceway	76	14.27	130	3.25
Release	140	96.04	15	3.50

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

See Section 9.2.4 above.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

All fry are started on BioProducts Bio-Diet starter feed # 2 and #3. Fish are initially fed by hand. Once a response is seen, feeding commences with an automatic belt feeder. Feed amounts and sizes will vary depending on the manufacturer recommendations as fish grow (Table 14). BioProducts grower feed is administered once fish are transferred to outside raceways.

Table 13. Fish/pound, % body weight fed, feed size and term in culture information.

Fish/pound	% Body weight fed/day	Feed Size	Term in culture
Swim-up to 800 fpp	3.5	#2/#3 starter	Nov. – Jan.
800 – 500	3.3	#3 starter	Jan. – Feb.
500 – 400	2.5	1.0 mm	Feb. – March
400 – 350	2.5	1.0/1.3 mm	March – April
350 – 300	2.3	1.3 mm	April
300 – 250	2.2	1.3 mm (med)[1]	May – June
250 – 150	2.4	1.5 mm	June
150 – 110	2.4	1.5 mm	June – July
110 – 90	2.5	1.5 mm	July – August
90 – 50	2.2	2.5 mm	August – Sept.
50 – 17	2.0	2.5 mm	Sept – Oct.
17 to release	maintenance	3.0 mm (med)[1]	Oct. – release

[1]Medicated feed

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

Hatcheries could potentially introduce diseases into the natural environment. Disposal of wastes or pathogen-contaminated water elevates the risk for fish to contract diseases. The IDFG fish health staff will conduct scheduled inspections and random ones if necessary. Individuals may be given injections of Erythromycin-200, oxytetracycline, or other prophylactic treatments to counter specific diseases, however consideration to Tribal fisheries will dictate treatments. During rearing, juveniles will be fed two meals of medicated feed. Disinfection protocols for foot baths, equipment, trucks, vats, raceways, and nets are in place for sanitation purposes.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

Not Applicable

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

Rearing conditions of YFCSS hatchery juveniles will be as consistent with natural conditions as possible. In theory, rearing raceways containing natural substrate, structure, feeding mechanisms, temperature, flow velocities, light, and densities will produce fish with characteristics similar to wild counterparts. Currently, the LSRCP is conducting ongoing Hatchery Evaluation Studies on this subject.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

Proper disinfection procedures, antibiotic treatments, and egg culling criteria will be used to limit the spread of disease. Fish observation and raceway cleaning will be conducted on a regular basis. Artificial selection should be limited by rearing juveniles consistent with natural conditions.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels.

Table 14. Proposed release number and size for the YFCSS.

Age Class	Maximum Number	Size (fpp)	Release Date	Location	Rearing Hatchery
Eggs					
Unfed Fry					
Fry					
Fingerling					

Age Class	Maximum Number	Size (fpp)	Release Date	Location	Rearing Hatchery
Yearling	200,000	20 FPP	4/1 – 4/30 Annually	Yankee Fork	Sawtooth

10.2) Specific location(s) of proposed release(s).

Stream, river, or watercourse: Yankee Fork
Release point: Eightmile or Jordan Creek Confluence & Pond Series 1 and/or 4
Major watershed: Yankee Fork Drainage of the Salmon River
Basin or Region: Salmon River Basin

10.3) Actual numbers and sizes of fish released by age class through the program.

In 2006, 135,934 smolts were released in Yankee Fork. In 2010, 400,000 smolts were released. Prior releases by the IDFG are also included in the Table 10.

10.4) Actual dates of release and description of release protocols.

Yankee Fork has a long history of artificial production (Table 10). With no long-term monitoring and evaluation little information exists on the effects of NOR population as a result of artificial production. Further information is presented below in Table 16 on release year, hatchery, life stage, and date of release for Yankee Fork.

YFCSS salmon will be released in the month of April coinciding with changes in length of day, discharge, temperature and noticeable physiologically and morphological changes of smolt. Generally, in the third week of April there is a noticeable physiological change in the fish. Fish will be allowed to volitionally emigrate. Those fish that choose not to leave will be forced from the truck.

Table 10. Yankee Fork Chinook salmon artificial propagation history 1987-2009.

Release Year	Rearing Hatchery	Life Stage	Date Released
1987	Sawtooth	pre-smolt	6/1987
1988	Sawtooth	smolt	3/14 – 3/18/1988
1989	Sawtooth	smolt	3/21/1989
1990	Sawtooth	smolt	3/20/1990
1990	Yakima	fry-fingerling	7/20/1990;10/10/1990
1991	Sawtooth	fry-fingerling	9/1991
1994	Sawtooth	smolt	10/1994
2006	Sawtooth	smolt	4/3 – 4/21/2006
2008	Sawtooth	adult	7/30 – 9/4/2008
2009	Sawtooth	adult	7/14 – 9/2/2009

10.5) Fish transportation procedures, if applicable.

See section 5.2

10.6) Acclimation procedures (*methods applied and length of time*).

All spring Chinook salmon juveniles at SFH are reared on river water. Smolts released into Pond Series 1 and/or 4 will be allowed to volitionally emigrate into the main stem after several days of acclimation. Smolts released at Jordan Creek or Eightmile confluence will be direct stream releases.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

With respect to BY 08 and 09 approximately 400,000 smolts will be released annually with 50% of these smolts receiving adipose fin clips. Beginning in 2010, the smolt release target will be 200,000 smolts, with intact adipose fins. The goal of the YFCSS is to return fish for population recovery and harvest. Generally, fish intended for harvest interception are marked with an adipose fin clip. Adipose fin clipping Yankee Fork juveniles could, and probably will, further decrease smolt to adult return rates due to sport fisheries in other regions.

Passive integrated transponders (PIT tags) will be injected into 15% of juveniles prior to release to monitor survival and dispersal to Lower Granite Dam by using the SURPH model. PIT tags will also provide ability to predict annual returns and allow the YFCSS to develop annual spawning and harvest plansTissue samples will be collected from parent broodstock to generate a genetic parental assignment database.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

Excess smolt production above the program goal will be released into the Yankee Fork. If hatchery operations are negatively affected due to increased densities, a randomly selected proportion of eggs or parr will be released into Yankee Fork.

10.9) Fish health certification procedures applied pre-release.

Testing for bacterial kidney disease, whirling disease, and viral replicating agents will be conducted under the Idaho Fish and Game Eagle Fish Health Laboratory between 45 and 30 days prior to release to obtain fish health certification.

10.10) Emergency release procedures in response to flooding or water system failure.

The YFCSS will follow the emergency release procedures and protocols developed for the SFH.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

YFCSS actions taken to minimize adverse effects on listed fish include:

1.) Follow the health practices, procedures, and guidelines in place at the Sawtooth Fish Hatchery.

2.) Select proper release sites to utilize excellent spawning and rearing habitat.

3.) Program smolt releases with noticeable physiological changes in fish and natural rising water levels.

4.) Maintain rearing condition as equivalent as possible to those in the natural environment.

5.) Annual collection of broodstock with characteristics similar to historically evolved populations.

6.) Help Idaho Fish and Game and Sawtooth Fish Hatchery conduct continuing Hatchery Evaluation Studies.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

See section 1.10.1 and 1.10.2

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

The Shoshone-Bannock Tribes monitor and evaluation program will need to be fully funded and appropriately staffed to achieve the goals and objectives of the YFCSS.

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

The YFCSS weir will be constantly monitored to limit the holding period and minimize adverse impacts to ESA-listed spring Chinook salmon and other listed species. Handling and tagging activities will be conducted to minimize injuries, stress, and mortality. Monitor and evaluation procedures include redd counts, creel surveys, carcass recoveries, tissue sampling, and density and abundance analyses to determine effects to listed fish.

SECTION 12. RESEARCH

12.1) Objective or purpose.

The Tribes will manage Yankee Fork in a manner that promotes recovery of the ESU and allows management flexibility. Our expectation for Yankee Fork is to manage this population under "maintained" criteria having less than a 25% risk threshold of extinction in 100 years. Since Yankee Fork Chinook are currently listed at a high risk of extinction for both A/P (> 25% risk of extinction in the next 100 years) and S/D (high risk of extinction in the next 100 years), we plan to initiate a supplementation program that will immediately increase abundance, spatial structure, and potentially diversity, all of which will assist in recovery of population.

Success will be based on improving viability at the distinct population level; changes in abundance, productivity, diversity and distribution of steelhead and Chinook salmon will be measured. The M&E plan is designed to identify successes as well as problems so that improvements can be made through adaptive management.

12.2) Cooperating and funding agencies.

U.S. Fish and Wildlife Service – Lower Snake River Compensation Plan Office
IDFG

12.3) Principle investigator or project supervisor and staff.

Name (and title): Lytle P. Denny, Anadromous Fish Manager.
Agency or Tribe: Shoshone-Bannock Tribes.
Address: 3rd and B Avenue, P.O. Box 306, Fort Hall, ID 83203.
Telephone: (208) 239-4560 or cell 221-9058.
Fax: (208) 478-3986.
Email: ldenny@shoshonebannocktribes.com

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

Not Applicable.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

Research techniques for the monitor and evaluation of the YFCSS include: hatchery operations, tissue and scale sampling, abundance and density, harvest monitoring, and juvenile out-migration and adult returns.

Hatchery Operations
IDFG, LSRCP, and SFH staff monitors hatchery conditions (diet, ration, vat or raceway environmental conditions, growth, survival rates, mortalities, disease) and evaluate hatchery-related research.

Tissue and Scale Sampling

Broodstock males and females sampled for genetic analysis and parental assignment. Samples obtained through a operculum punch. Scale samples obtained for age and life history determination as a contingency to tissue samples. Proportion of natural-origin juveniles are tissue sampled prior to out-migration to determine proportion of w x w, w x h, h x h produced

offspring. Un-marked adults sampled at the Yankee Fork weir will also be tissue sampled to determine origin. All samples stored in 95% ethanol for later analysis. A DNA parentage analysis will reveal relative productivity of wild and hatchery F1 and F2 juveniles and adults.

Abundance and Density
Operation of a rotary screw trap to document and determine abundance of migrating juvenile Chinook salmon. If electroshocking, use in accordance with NMFS ESA permits. Fork length and mass of each individual recorded. Fin tissue and scale samples taken from juveniles to link to adult parents and broodyear.

Harvest Monitoring
Conduct creel surveys and estimate total Chinook catch. Obtain tissue sample, fork length, gender, CWT, or PIT information from harvested Chinook. Provide Shoshone-Bannock tribal fisherman with scale envelops to preserve scales from harvested fish not surveyed and sampled. Total fish harvested, pressure, and CPUE estimated yearly.

Juvenile Out-migration and Adult Returns
Proportions (15%) of hatchery smolts released are PIT tagged to monitor dispersal, emigration, and arrival at Lower Granite Dam by using the SURPH model. In addition, natural produced smolts will be PIT tagged to detect survival differences between life stages for hatchery and naturally produced offspring. Adult returns are monitored through dam and weir counts, creel surveys, CWT information, redd surveys, spawning surveys, and carcass recoveries.

12.6) Dates or time period in which research activity occurs.

Hatchery conditions and research are monitored daily and throughout the year by IDFG, LSRCP, and SFH staff and personnel.

Tissue and scale sampling is conducted yearly for broodstock, smolt release, harvest monitoring, screw trap operation, and electrosampling.

Harvest information through creel surveys is collected during the time of tribal fisheries. Mail surveys sent out after closure of season and compared to harvest information collected during fishing period.

Adult escapement is monitored at dams, traps, mark/recapture studies, and through surveys throughout most of the year. Smolt emigration monitored from March through November. PIT tag and coded-wire tag queried from informational systems throughout the year.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

See section 9.

12.8) Expected type and effects of take and potential for injury or mortality.

See Table 17. Generally, take for research activities are defined as: “observe/harass”, “capture/handle/release” and “capture, handle, mark, tissue sample, release.”

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table."

See Table 17.

12.10) Alternative methods to achieve project objectives.

No alternative methods to achieve research objectives were/have been developed or initiated.

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.

Not Applicable.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.

See Section 11.2.

SECTION 13. ATTACHMENTS AND CITATIONS

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SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 11. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: Spring/Summer Chinook Salmon ESU/Population: Yankee Fork/Upper Salmon Mainstem Activity: YFCSS				
Location of hatchery activity: Yankee Fork and Sawtooth Fish Hatchery Dates of activity: Annually Hatchery program operator: Shoshone-Bannock Tribes				
	Annual Take of Listed Fish By Life Stage *(Number of Fish)*			
Type of Take	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)			1,500	
Collect for transport b)		200,000[4]	120[1]	
Capture, handle, and release c)			100%[2]	
Capture, handle, tag/mark/tissue sample, and release d)		15%[5]; 50%[6]; 50%[7]		
Removal (e.g. broodstock) e)			120	
Intentional lethal take f)			120[3]	
Unintentional lethal take g)	36,500[8]		Pre-spawn mortality varies and may be as high as 8%.	
Other Take (specify) h) Carcass sampling				

1. Maximum number of adults retained for broodstock.
2. All adults handled at weir.
3. Maximum take numbers annually, dependent on total adult return
4. Smolts transported from SFH to Yankee Fork for release.
5. 15% smolts PIT tagged prior to release.
6. 85% smolts CWT prior to release.
7. 50% smolts Adipose fin-clipped prior to release.
8. 15% mortality from green egg to smolt stage.