LYONS FERRY COMPLEX
ANNUAL OPERATIONS PLAN

For the Period of

OCTOBER 1, 2017 – SEPTEMBER 30, 2018

Prepared by:

Washington Department of Fish and Wildlife

Washington Department of FISH AND WILDLIFE

Nez Perce Tribe

NEZ PERCE FISHERIES

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Confederated Tribes of the Umatilla Indian Reservation

CAYUSE - WALLA WALLA - UMATILLA CONFEDERATED TRIBES OF THE UMATILLA INDIAN RESERVATION Treaty of 1855

OREGON Fish & Wildlife

LOWER SNAKE RIVER COMPENSATION PLAN Hatchery Program

Funded By the Bonneville Power Administration through the Lower Snake River Compensation Plan

BONNEVILLE POWER ADMINISTRATION

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A. Facilities

Lyons Ferry Complex (LFC; See Figure 1) includes Lyons Ferry Hatchery (LFH), Tucannon Hatchery (TFH), Cottonwood Acclimation Facility (Cottonwood AF), Dayton Acclimation Facility (Dayton AF), and Curl Lake Acclimation Facility (Curl Lake AF).

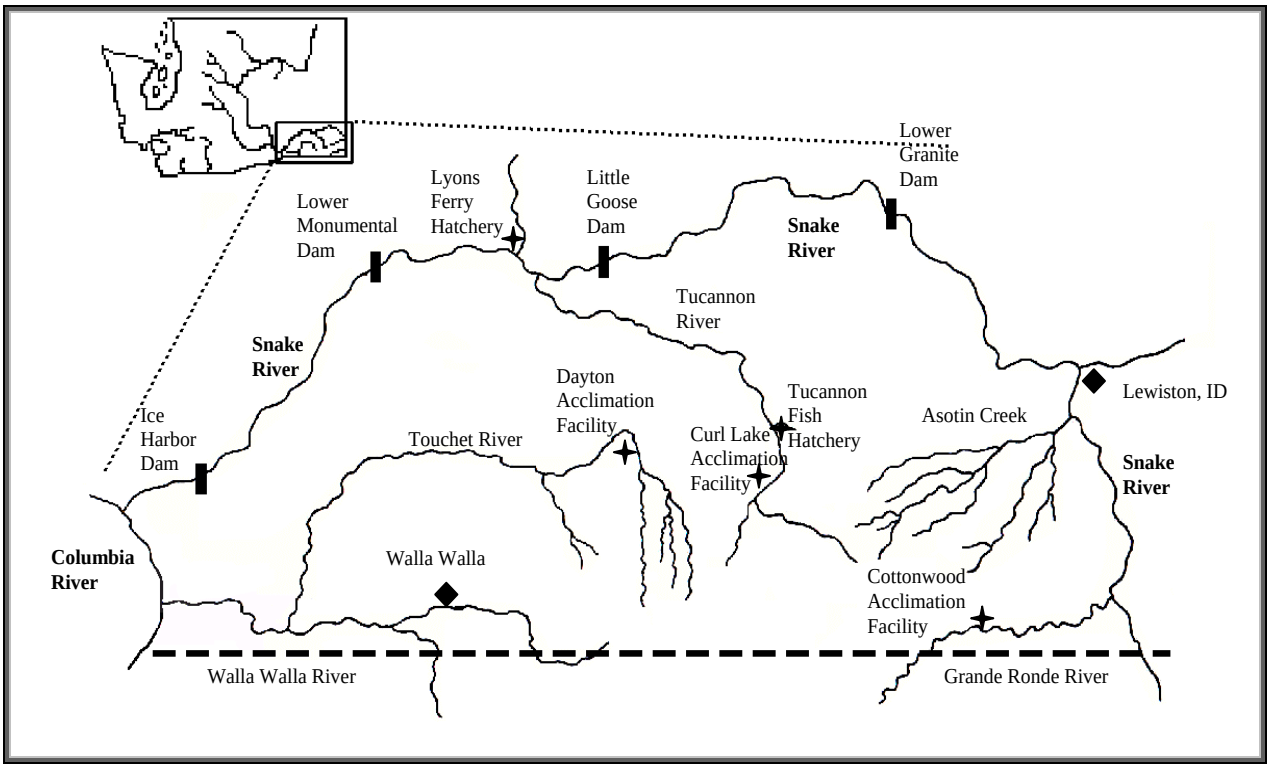

Figure 1. Map of the Lower Snake River Compensation Plan (LSRCP) LFC Facilities, and major rivers and streams in Southeast Washington.

LSRCP funded fish production in Washington began in 1983, with the construction of trout and steelhead rearing facilities at LFH. Construction of salmon hatchery facilities and steelhead acclimation sites followed, and were completed in 1985. Major upgrades at TFH also occurred at that time, and operation of that facility has been funded by LSRCP ever since. Production at all facilities has been directed toward meeting established hatchery return goals of 18,300 adult fall Chinook, 1,152 adult spring Chinook, 4,656 adult summer steelhead; plus providing 67,500 angler days of fishing opportunity from 79,000 pounds of rainbow trout production (currently planted at 2.5 fish per pound (fpp), and also including 73,200- fall Chinook, 4,608 spring Chinook and 9,312 summer steelhead for downstream harvest. In addition to these LSRCP hatchery production goals to mitigate for expected hydro system losses (approximately 48% of total desired population returns), the LSRCP hatchery program has contributed to conservation efforts to maintain and restore native populations of salmon and steelhead. Additional hatchery

production of jumbo-sized (1.5 pounds each) rainbow trout at TFH that historically was state funded is now funded by the Tri-State Steel headers (non-profit organization).

1. Lyons Ferry Hatchery

The LFH is located along the Snake River at river mile (RM) 59.1, directly below the confluence of the Palouse River in Franklin County, Washington (Figure 1). Initially it was operated as two separate facilities. Washington Department of Wildlife (WDW) operated the north-side hatchery, producing steelhead and rainbow trout. Washington Department of Fisheries (WDF) operated the south-side hatchery, rearing spring and fall Chinook. A merger of the two agencies in 1994 led to a merging of the two facilities, and has since been operated by the Washington Department of Fish and Wildlife (WDFW) through LSRCP funding as LFH.

LFH facilities include two incubation buildings with office space and feed storage, plus adult fish trapping, holding and spawning structures. A visitor center provides interpretive information for guests of the hatchery. There are eight residences on-site for staff to fulfill security and emergency response needs.

The LFH rearing facilities include twenty-eight raceways at 10 ft x 100 ft x 2.8 ft and nineteen raceways at 10 ft x 88.5 ft x 3.5 ft. The raceways rear all species produced at LFH (spring and fall Chinook, summer steelhead, and rainbow trout). These raceways are covered in 2" square mesh netting. There are three large rearing lakes (643,500 cubic feet (ft^3) of water each; 1,100 ft x 90 ft x 6.5 ft dimensions) which are also covered in 2" netting holding ~,. Netting has significantly reduced predation since being installed in 2006-08. The steelhead and spring Chinook adult holding facilities include three 83 ft x 10 ft x 5 ft adult raceways with an enclosed spawning building incorporated over the center of these ponds. There are four 8.5 ft x 150 ft x 4.3 ft and four 10 ft x 150 ft x 4.3 ft adult fall Chinook salmon holding ponds, which also accommodate fall Chinook subyearling rearing in the spring months. The incubation facilities include 112 full Heath Tray stacks (2 units of 8 trays each) of vertical incubators in the south-side hatching building, and 88 shallow eyeing/hatching troughs and four 3.75 ft x 27.5 ft x 2 ft intermediate rearing troughs in the north-side hatching building.

Water is supplied to LFH from the Marmes pump station, which has emergency power backup generation that was completely upgraded between 2013 and 2016. The Marmes pump (wells) facility has three 300 horsepower (hp) pumps, four 200 hp pumps and one 75 hp pump. The well water right for LFH is 53,200 gallons per minute (gpm), or 118.5 cubic feet per second (cfs) of flow and water temperature is a constant 52^oF.

2. Tucannon Hatchery

The TFH is located along the Tucannon River, between the towns of Dayton and Pomeroy Washington, at RM 36 in Columbia County (Figure 1). Fish production began in 1949 by the WDW. In 1983, construction began to remodel the hatchery as part of a transfer of ownership to LSRCP. Since November 1986, when construction was completed, the LSRCP has funded operations.

The TFH includes a combined incubation and office building, back-up power generation building, feed storage shed, shop, domestic water building, two well houses and a spring water collection building. There is also a river intake and adult trapping facility located upstream of Rainbow Lake along the Tucannon River, (Rainbow Lake intake). There are two residences for staff on site to fulfill security and emergency response needs.

The TFH is supplied with three different water sources, (river, well, and spring). River water is captured from the Tucannon River at the Rainbow Lake intake and ranges in temperatures from 33 to 60 ^{o}F during use by the hatchery. The Rainbow Lake intake is located one half mile upstream of the hatchery. The captured water travels down an open channel into Rainbow Lake. From the outlet of Rainbow Lake the water travels through an 18" above ground pipeline (replaced in 2005) to TFH. Rainbow Lake functions as a reservoir to provide the hatchery with cooler water in the summer months and warmer water in the winter months. It also provides a pool of water to draw from when encountering adverse intake conditions along the Tucannon River, resulting in temporary loss of water flows. An estimated 8 hours of water supply is currently available; however, a proposed dredging project and restructuring of Rainbow Lake will increase its capacity and supply. The water right for the Rainbow Lake intake is 16 cfs. Well water is pumped from two separate sources to an aeration tower, and then gravity fed to the rearing units and the domestic pump building. The combined well water right is 2 cfs, with temperatures from well #2 between 54 – 57 ^{o}F and well #3 a constant 61 ^{o}F. Spring water is pumped from an underground collection site to the same aeration tower as the well water and gravity fed to the rearing units. The water right for spring water is 5.3 cfs, and has a nearly stable temperature of 51 or 52 ^{o}F.

The rearing vessels at TFH include 40 concrete 1 ft x 15 ft x 0.5 ft shallow troughs, six concrete round ponds approximately 40 ft in diameter with a maximum of 2,660 ft^3 of rearing area each, two concrete 10 ft x 80 ft x 3 ft raceways, one concrete 15 ft x 136 ft x 5 ft raceway and one earthen rearing pond with a maximum of 136,221 ft^3 of rearing space (170 ft x 200 ft x 6.5 ft). Species reared at TFH include rainbow trout, spring Chinook and summer steelhead.

3. Cottonwood Acclimation Facility

Cottonwood AF is located along the Grande Ronde River at RM 28.7, directly above the confluence with Cottonwood Creek in Asotin County, Washington (Figure 1). Construction was completed in February 1985.

This facility includes an adult trapping facility on Cottonwood Creek, and a small storage building. Cottonwood AF has a concrete channel with earthen walls and holds ~357,000 ft^3 of water. It has a water right of 2,694 gpm (6 cfs) for the period January 1st through July 1st. It is

supplied with water from Cottonwood Creek through a gravity water supply system, with the intake integrated into the adult trapping facility located ~ 0.10 miles above the pond. Water temperatures range from 34 to 52 ^{o}F during operation of the facility. It also has a small trailer for use by staff required to be on-site at all times while the pond is in operation. It is presently used for acclimation and release of Wallowa stock summer steelhead into the Grande Ronde River.

4. Dayton Acclimation Facility

Dayton AF is located along the Touchet River at RM 53 in Columbia County, Washington (Figure 1). There is an adult trapping and intake facility on the Touchet River just upstream of the acclimation pond at RM 53.3.

Construction of the Dayton AF was completed in October 1986. This pond is asphalt lined and holds ~ 200,000 ft^3 of water. The water right to this pond is 2,694 gpm (6 cfs) for the period of Jan 1st – June 1st of each year. It is supplied with water from the Touchet River through a gravity water supply system, with the intake located at the adult trapping and bypass facility approximately 0.3 miles upstream. Water temperatures during operations for steelhead acclimation range from 34 to 52 ^{o}F. The pond is located adjacent to the Snake River Lab evaluation office and has a storage garage for equipment and feed. It also has a small trailer for use by staff required to be on-site at all times while the pond is in operation. It is presently used for acclimation and release of both Wallowa and Touchet stock summer steelhead into the Touchet River. The water intake, adult trap, and fish ladder structure was rebuilt in 2008 and serves multiple functions. During the late spring and summer months, local irrigators collect water from this intake via a separate screen box and pipeline.

5. Curl Lake Acclimation Facility

Curl Lake AF is located along the Tucannon River at RM 41 in Columbia County, Washington (Figure 1). The construction of Curl Lake AF was completed in February 1985. Curl Lake AF is an earthen pond holding ~ 784,000 ft3 of water. It has a water right of 2,694 gpm (6 cfs). It is supplied with water from the Tucannon River through a gravity water supply system. It is currently utilized for acclimation of Tucannon spring Chinook and Tucannon summer steelhead for release into the Tucannon River. Water temperatures during spring acclimation range from 34 to 48 ^{o}F. Chinook acclimation in Curl Lake AP started in 1997 following many years of steelhead acclimation at this site. After the spring Chinook are released in mid-April, steelhead are brought in for a1-2 week acclimation period and are volitionally released from the time they enter to early May. Following the steelhead release, the pond is stocked with resident trout for fishing. It is emptied after fishing season ends October 31st each year, and recharged by hatchery staff prior to spring Chinook acclimation the following January.

Due to high predation at Curl Lake on spring Chinook pre-smolts, LSCRP provided the funding for a cyclone fence which was installed in early 2015. WDFW staff maintains and monitors the fence and have added an electric wire around the perimeter to keep predators from climbing over the fence. The fence works great for keeping out mammalian predators, but an avian predation issue may still exist. This potentially high predation issue was found through the use of a PIT tag array that was installed at the outlet of the lake which contains five detectors. We will

continue to refine the use of the PIT Tag Array and how Curl Lake is drawn down during releases to provide the most accurate estimate of fish released. In 2016, staff also added a propane cannon to scare of avian predators that seemed to help.

6. Fall Chinook Acclimation Project (FCAP)

In addition to WDFW acclimation sites, LFC provides up to 450,000 yearling and 1,600,000 subyearling fall Chinook to three acclimation facilities operated by the Nez Perce Tribe (NPT): Pittsburg Landing, 550,000, and Captain John's Rapids, 850,000, and Big Canyon, 650,000. Greater details of these facilities and their operations can be found in Appendix D.

B. Fish Production Summary

Annual hatchery production is intended to meet LSRCP adult return goals for several species. Current production levels are set to both conserve and rebuild the Chinook populations, or to meet the adult hatchery return goals for steelhead while minimizing any adverse effects on Endangered Species Act (ESA) listed salmon and steelhead (Table 1). Production levels for salmon and steelhead at LFC have been approved through the U.S. v Oregon (US v OR) 2008-2017 Management Agreement. LFC is planning BY2017 fall Chinook production based on table B4B in the US v OR agreement. The spring Chinook production goal is 225,000 smolts per year (as agreed to under US v OR, initial release at this level began in 2007 from the original program of 132,000). LFC is currently utilizing two hatchery steelhead stocks (Wallowa and Tucannon) to fulfill harvest mitigation objectives under LSRCP, and also utilizes two stocks (Touchet and Tucannon), for conservation purposes in the Touchet and Tucannon rivers. The numbers of fish released in 2017 were annual goals proposed in 2005, (Table 2), and revised through the Production Advisory Committee (PAC) in 2010. Changes were negotiated by the co-managers.

It is important to stress that *any* change to a specific program at LFH or TFH will potentially impact the other programs, so "current capacity" values shown in (Table 1) represent rearing limits *as the programs are structured today.* Additionally, restrictions anywhere within the rearing cycle will determine program size. Restrictions can be rearing vessels, water, tagging groups and schedules, fish management decisions regarding harvest or adult return contribution and carrying capacity, etc.

Monitoring and Evaluation (M&E) has been ongoing since 1983 and 1985 for trout and salmon programs respectively. Recent emphasis has centered on meeting ESA permitting and recovery planning requirements. Hatchery Scientific Review Group (HSRG) and Hatchery Review Team (HRT) recommendations are likely to affect production actions and management decisions in the coming years. Routine monitoring includes length, weight, K factor, external fin evaluation, tag retention and fish health examinations. Pre-release quality control checks on fin clips, tag retention, etc. is completed on all WDFW releases by WDFW staff.

Table 1. LFC production capacities (historical design versus current 2017-18 production goals).

Facility	Location River (Mile)	Water Source	Species	Designed Capacity (#Fish)	Designed Capacity (Pounds)	Current Program Capacity (#Fish)	Current Program Capacity (Pounds)
Lyons Ferry[a]	Snake (59)	Wells	Fall Chinook Spring Chinook Steelhead Rainbow TOTALS	9,160,000 132,000 931,200 260,000 **10,483,200**	101,800 8,800 116,400 86,000 **313,000**	2,700,000 230,000 585,000 126,750 **3,641,750**	107,800 9,200 111,944 48,443 **277,357**
Tucannon[b]	Tucannon (36)	Wells, Springs, Tucannon R.	Spring Chinook Rainbow Steelhead TOTALS	132,000 210,000 -0- **342,000**	8,800 39,285 -0- **48,085**	230,000 98,000 50,000 **425,298**	14,056 43,719 11,111 **68,886**
Cottonwood AF	Grande Ronde (28.7)	Cottonwood Creek	Steelhead	**250,000**	**31,250**	**225,000**	**50,000**
Curl Lake AP	Tucannon (41)	Tucannon R.	Steelhead Spring Chinook TOTALS	160,000 **160,000**	32,000 -0-	50,000 225,000 **275,000**	11,111 18,750 **29,861**
Dayton AF	Touchet (53)	Touchet R.	Steelhead	**125,000**	**27,750**	**150,000**[c]	**33,333**[c]

[a]Lyons Ferry Hatchery was designed to accommodate subyearling Chinook based on the traditional density factor of 0.18. However, with regards to fish health, fish quality, increased yearling production, marking strategies that have been implemented since construction, and water composition, the density index must not exceed 0.09 for subyearlings and 0.14 for yearlings.

[b]Tucannon Hatchery was initially designed for rainbow and spring Chinook. Following facility modifications in the 1980's, and the construction of Curl Lake as an acclimation site, increased production for rainbow trout, spring Chinook, and incorporating a steelhead conservation program, were all implemented.

[c] 50,000 endemic smolts will be added to the AF when volitional release begins on the Wallowa stock. No feeding will occur at this point and fish will be leaving the pond.

Table 2. LFC plants and transfers by brood years (BY) – three-year profile.

Species	Year slated for release/transfer				
	2017 Goal	2017 Actual Plants and Transfers	2018 Goal [a]	Fish/Eggs on Hand For 2018 Goal	2019 Tentative Plan [a]
Fall Chinook					
Yearling releases:	**BY 2015**	**BY 2015**	**BY 2016**	**BY 2016**	**BY 2017**
LFH-on station	450,000	458,558	450,000	474,824	450,000
NPT – FCAP (transfer)	465,000	462,956	455,000	481,054	455,000
Subyearling releases:	**BY 2016**	**BY 2016**	**BY 2017**	**BY 2017**	**BY 2018**
LFH-on station	200,000	613,331[c]	200,000	0	200,000
NPT – FCAP	1,403,000	1,476,798	1,403,000	0	1,403,000
NPT – Capt. John 2	201,000	0	201,000	0	201,000
Eyed Egg Transfers:	**BY 2016**	**BY 2016**	**BY 2017**	**BY 2017**	**BY 2018**
Irrigon-IPC	1,100,000	1,100,000	1,100,000[b]	0	1,100,000[b]
Irrigon - Direct – GRR	440,000	440,000	440,000[b]	0	440,000[b]
Spring Chinook					
	BY 2015	**BY 2015**	**BY 2016**	**BY 2016**	**BY 2017**
Yearling smolt production	225,000	240,000	225,000	211,098	225,000
Summer Steelhead (Stock)					
	BY2016	**BY 2016**	**BY2017**	**BY 2017**	**BY 2018**
On Station (Wallowa)	110,000	81,021	60,000	70,000	60,000
Touchet (Wallowa)	85,000	85,490	100,000	112,475	100,000
Walla-Walla (Wallowa)	100,000	65,796	0	0	0
Cottonwood (Wallowa)	160,000	163,016	185,000	189,561	225,000
ODFW Wallowa Hat	40,000	40,000	40,000	40,000	0
Tucannon (Endemic)	100,000	72,158[d]	150,000	123,805[e]	150,000
Touchet (Endemic)	50,000	57,390[f]	50,000	52,535[g]	50,000
Spokane Rainbow Trout					
Mitigation	**BY 2015**	**BY 2015**	**BY 2016**	**BY 2016**	**BY 2017**
Catchables	197,500	189,641	197,500	222,089*	197,500
Jumbo's	1,000	1,033	1,000	1,500	1,000
IDFG Catchables	17,600	16,000	16,000	18,000	16,000
Jumbo's – NPT's	1,650	1,425	1,650	2,116	1,650
State Program					
Jumbo's – TSS organization	4,000	5,030	4,000	5,843	4,000

[a] Based on the *US v. Oregon* table B4b.;
[b] Transfer numbers include an 10% overage to assure meeting mitigation goals due to possible coagulated yolk .
[c] Includes 308,752 that were incidentally released in May and 100,000 extra's that were direct released into the Tucannon river.
[d] 49,545 for the conservation program and 22,613 towards the mitigation program.
[e] 55,707 for the conservation program and 68,098 towards the mitigation program.
[f] 34,080 mixed stock and 23,310 wild stock
[g] 30,941 mixed stock and 21,594 wild stock
*Extra Rb will be planted out at fall plantings

II. SNAKE RIVER FALL CHINOOK

The fall Chinook production program at LFH is the cornerstone of a highly coordinated and integrated artificial program for Snake River fall Chinook, implemented through the LSRCP program, the Idaho Power Company (IPC) Hells Canyon Settlement Agreement, and the Nez Perce Tribal Hatchery (NPTH) with funding through BPA. Broodstock for the program at LFH are primarily collected at Lower Granite Dam (LGR), but may be collected at LFH if trapping at LGR is limited.

The *US v OR* 2008-2017 Management Agreement included two tables that determined priority release locations and numbers for fall Chinook production at LFH; production priorities contained in Tables *B4A* and *B4B*. A policy decision has been made to use *B4B* from that agreement. For this AOP, LFH is planning BY2017 fall Chinook production based on table *B4B*, (Table 3). The management parties will continue to discuss alternatives to the current releases in the coming year.

The LFH was initially designed to release 9.16 million fall Chinook subyearlings (Table 1) at around 90 fpp. Currently LFH produces 1.8 million subyearlings at approximately 50-75 fpp and another 905,000 yearlings at 10-12 fpp. LFH will transfer 455,000 yearlings and 1,604,000 subyearlings annually to the FCAP facilities. Size at transfer to the FCAP facilities is 12 fpp for yearlings and 65 - 75 fpp for subyearlings. Size at release goal for acclimated fall Chinook yearlings is 10 fpp and 50 fpp for subyearlings. Approximately 1,540,000 eyed eggs will be transferred to and reared at the Oregon Department of Fish and Wildlife's (ODFW) Irrigon Hatchery for the LSRCP and IPC programs. The size at release for these subyearling programs are also 50 fpp. The production destined for the Grande Ronde was historically reared at LFH. However, co-managers recognized the opportunity to shift the program to Irrigon Hatchery, which reduced densities, improved fish health, and creating additional rearing flexibility at LFH.

Table 3. Revised production table listing Snake River fall Chinook salmon production priorities for LFH (Per the *USvOR* Management Agreement, Table *B4B*, for Brood Years 2008-2017)

Priority	Production Program				
	Rearing Facility	**Number**	**Age**	**Release Location(s)**	**Marking**
1	Lyons Ferry	450,000	1+	On station	225,000Ad+CWT 225,000 CWT
2	Lyons Ferry	150,000	1+	Pittsburg Landing	70,000 Ad+CWT 80,000 CWT only
3	Lyons Ferry	150,000	1+	Big Canyon	70,000 Ad+CWT 80,000 CWT only
4	Lyons Ferry	150,000	1+	Captain John Rapids	70,000 Ad+CWT 80,000 CWT only
5	Lyons Ferry	200,000	0+	On station	200,000 Ad+CWT
6	Lyons Ferry	500,000	0+	Captain John Rapids 1	100,000 Ad+CWT 100,000 CWT only 300,000 Unmarked
7	Lyons Ferry	500,000	0+	Big Canyon	100,000 Ad+CWT 100,000 CWT only 300,000 Unmarked
8	Lyons Ferry	200,000	0+	Pittsburg Landing	100,000 Ad+CWT 100,000 CWT only
9	Irrigon	200,000	0+	Hells Canyon Dam	200,000 Ad+CWT
10	Lyons Ferry	200,000	0+	Pittsburg Landing	200,000 Unmarked
11	Lyons Ferry	200,000	0+	Captain John Rapids 2	200,000 Ad+CWT
12	Irrigon	200,000	0+	Grande Ronde River	200,000 Ad+CWT
13	Irrigon	200,000	0+	Hells Canyon Dam	200,000 Ad Only
14	Irrigon	200,000	0+	Grande Ronde River	200,000 Unmarked
15	Irrigon	600,000	0+	Hells Canyon Dam	600,000 Ad only
TOTAL	**Yearlings**	**900,000**			
	Subyearlings	**3,200,000**			

A. Fish on Hand

Brood Year 2016

At the end of August 2017, LFH had 955,878 juvenile Snake River fall Chinook on hand. Fish were marked in July/August. The program goal is to transfer 455,000 yearlings to FCAP facilities in February and March of 2018, and release 450,000 yearlings on-station at LFH in early spring 2018(Table 4). LFH expects to transfer 470,000 yearlings to the FCAP facilities and direct release 470,000 yearlings at LFH. Approximately 30,000 of the on-station yearlings will be PIT tagged in August 2017. Fall Chinook released from FCAP facilities will also receive PIT tags (Table 4, **Appendix F**). The PIT tag detections will be used to estimate downstream juvenile survivals and to estimate the magnitude of the adult return as the fish are returning to the Columbia and Snake Rivers. Returning adult PIT tags in the fall of 2017 from the LFH on-station releases will also be used to select fish at LGR to radio tag as part of a fidelity and fallback study.

Table 4. BY16 Snake River yearling fall Chinook tagging, transfers and proposed releases.

Site	Expected Transfer	Expected Release	Size (fpp)	Age	Mark/CWT/	PIT Tags	Transfer/Release Date
LFH	N/A	474,000	10	1+	238,911 AD/ CWT 235,975 CWT Only	15,000 15,000	April 2018
Capt. John Rapids	160,000	159,000	12	1+	79,468 AD/CWT 81,032 CWT Only	1,500*	Feb – 2018 (transfer)
Pittsburg Landing	160,000	159,000	12	1+	79,538 AD/CWT 81,061 CWT Only	1,500*	Mar – 2018 (transfer)
Big Canyon	160,000	159,000	12	1+	79,452 AD/CWT 81,067 CWT Only	1,500*	Mar - 2018 (transfer)

*Note: tags and tagging to be provided by NPT

B. Trapping

Brood Year 2017

Tribal, state and federal inter-jurisdictional management of fisheries for conservation of natural populations, sharing of harvestable returns and ESA take, trapping of hatchery broodstocks and distribution of fish trapped in excess of brood needs is extremely complex. In an effort to better coordinate hatchery and harvest management, agencies in the basin have implemented a structured pre-season planning, in-season coordination, post season review and evaluation process. Weekly in-season coordination teleconferences occur and run projections, harvest estimates and hatchery trapping and broodstock collection data are exchanged. Co-managers have agreed to maximize natural origin fish that are incorporated into the broodstock. Trapping

protocols at LGR (within reasonable assumptions of what the Lower Granite Trap can handle) and broodstock spawning in-season management will be targeted to achieve at least 30% pNOB if possible.

The trapping objective, (**Appendix B**) for broodstock is up to 2,600 adults (which includes up to 1,300 females if needed) based upon previously observed stray rates and pre-spawning mortalities. The female collection goal for 2017 is 1,190. Each male may be used on up to three females so males are not needed at a 1:1 rate and fewer may be collected. This goal is the total numbers of fish that will need to be trapped to meet egg take goals through *Priority 15*. Brood collection occurs primarily at LGR, but may also occur at LFH or NPTH. Adults trapped at NPTH may be used to supplement LFH production shortages of LGR and volunteer adult returns, and vice versa.

1. Lyons Ferry Hatchery

Trapping at LFH will not occur unless necessary to meet broodstock goals. Volunteer trap was opened on September 8th due to the low number of returning adults bound for the Snake River over Bonneville dam according PIT tags to that point.

2. Lower Granite Dam

Trapping at LGR is scheduled to begin on August 18, but will be water temperature dependent. (**Appendix B**). The trap rate was initially set at 20% for 2017 and then increased to 33% on September 13th due to the low number of returning adults bound for the Snake River at Bonneville dam according to PIT tags to that point. Collected broodstock are divided between the LFH and NPTH (usually 70:30 ratio) as agreed upon annually, with a predetermined hauling schedule shared between both facilities to meet this need, an adjusted as necessary. Additional fish needed for run reconstruction needs will be hauled to LFH. The goal will focus on females in calculating the 70:30 split. Lower Granite staff will be taking PBT samples for fish that arrive prior to Aug. 18 that are thought to be falls in 2017. Pending genetic analysis, co-managers will look at trapping earlier that August 18 in future years.

C. Spawning

Brood Year 2017

Spawning will occur weekly, generally on Tuesdays and Wednesdays, starting on the 24th of October. It will continue until late November or early December, as necessary to meet egg-take goals.

All CWT's will be read prior to matings to determine origin and age structure. We will continue to increase the percentage of four and five year old fish in the broodstock to offset the past high incorporation rate of jacks in the broodstock and the higher harvest rate of these fish in lower river fisheries. Also, the goal for BY17 is to continue the strategy for reducing the number of "true jacks or jills" (i.e. one-salt fish) in the broodstock. Fork length criteria for broodstock will be adjusted in season to reflect accurate size at age estimates.

Full exclusion of strays in broodstock is preferred to retain Snake River stock integrity. To abide by the *US v Or* agreement to reach eggtake goals, if broodstock limited, stray females may be included in broodstock as long as matings including a stray do not exceed 5% of the total numbers of matings at LFH. In addition, any unmarked / untagged males used on a stray must be used on a known origin female in order to assure that gametes from potentially natural origin males will remain in production, even if the stray cross is culled. Strays will be incubated separately until we can determine if production goals can be met with Snake River origin females. If the goals can be met without using stays, the progeny will be culled. Jills, (one salt fish), will not be used in production unless it has been determined that we are broodstock limited, but their eggs will be fertilized for fecundity estimates. Jills that are spawned are to be mated with true adults. We desire to minimize the numbers of jills in the broodstock so they will be incubated separately until we can determine if production goals can be met with older aged females. If production goals can be met without using jills: 1) the progeny of jills will be culled after fecundity counts at eye up, or 2) released as unfed fry as they would be tagged by PBT, with option one as the top preference. See Table 5 for disposition of these unfed fry. If we are short on males during spawning, jacks may be used if they come from subyearling production groups. Priority would be to keep known Snake River origin Jills before keeping gametes from strays.

The mating protocol, (**Appendix C)**, will minimize hatchery stray incorporation into LFH broodstock while incorporating potentially as many wild fall Chinook as possible, striving to maximize the proportion of Natural Origin fish in Broodstock (pNOB).

Parental Based Tagging (PBT) tissue samples will be collected on all broodstock and any unmarked fish during spawning. This action began with the 2011 broodstock. Refer to the Hatchery and Genetic Management Plan (HGMP) and its Addendum for the full intent of the marking and tagging program.

Fertilized eggs will be water hardened for one hour in 100 ppm iodophor and incubated in vertical stack incubators. Distribution of progeny based on BKD ELISA sampling as identified in the fish health section of this document.

There is the potential that surplus Snake River origin fall Chinook may be available at the broodstock collection stations once egg take goals have been met. If so, all LGR transported adults with CWT will be sacrificed and sampled if needed for run reconstruction purposes, and any remaining non-CWT fish will be released back into the Snake River according to Table 5. In the event of broodstock releases during an ongoing fishery, the fish will be marked with a top caudal lobe clip to identify them as fish exposed to MS-222 or Aqui-S 20E. At this time LFH is not using Aqui-S as an anesthetic.

Table 5. Identified areas for fall Chinook juvenile and *adult out planting as presented in the June 1, 2006 Draft SRFMP.

Facility	Out plant Locations		
	Adults/jacks	Fry	Subyearlings
Lyons Ferry Hatchery	-Tucannon River -Grande Ronde River -Mainstem Snake River	-Tucannon River -Mainstem Snake River near LFH -Mainstem Snake River above LGR -Mouth of Palouse River	-Mainstem Snake near Captain John Rapids -Big Canyon -Grande Ronde River -Mainstem Snake downstream of Clearwater River
NPTH	-Lower mainstem Clearwater River, below North Fork	-Lower mainstem Clearwater River	-Lower mainstem Clearwater River

*-According to fish health guidelines, adults receiving antibiotic injections and/or being anesthetized must meet the withdrawal period for the antibiotic and/or anesthetic used prior to out planting.

D. Rearing

Brood Year 2017

Eggs are reared in the vertical incubators and are treated with formalin at a rate of 1:600 to control fungus on a daily basis. Eggs are shocked at eye-up around 580 temperature units (TU's). After eggs are picked, vexar screening is added to each tray to simulate substrate. Formalin treatments stop just before hatching. Hatched fry are transferred to raceways for rearing after yolk sac absorption at approximately 1,600 fpp, at approximately 1,900 TU's. Head troughs providing well water to the incubators are alarmed and visual inspections of flow through the trays along with head trough levels are conducted daily.

In addition to the standard raceways available for rearing fall Chinook, the adult salmon holding raceways are also utilized for subyearling fall Chinook rearing. By utilizing these larger ponds, densities in other raceways are substantially reduced. The un-marked groups that are CWT'd in the adult ponds will come from the same egg takes as their cohorts that will receive CWT's and ad-clips (to the extent that the egg takes will allow), and will be reared on the same growth regimen. The current density index for fall Chinook subyearlings up to marking is monitored so as not to exceed 0.09 lbs/cuft/in. Density index values can increase on a sliding scale to a maximum value of 0.14 lbs/cuft/in. for yearlings at 10-12 fpp. These density index goals were developed and agreed upon by all parties to improve fish quality and survival.

E. Tagging, Transfers and Releases

Brood Year 2017

This section outlines the anticipated subyearling and yearling production for BY17 assuming full production of Table 3. All tagging, transfers and releases are listed in Table 6.

Egg Transfers

Irrigon Hatchery will receive 1,540,000 eyed eggs for the IPC program and Grande Ronde direct release (LSRCP program). Eyed eggs are transferred from LFH to the Irrigon Hatchery in mid-December where the fish are reared, marked and tagged prior to release. Coded wire tags for the fish destined for the Grande Ronde will be purchased by WDFW and will have a WDFW Agency prefix. Quality control checks will be completed by WDFW and PIT tags will be inserted by IPC and WDFW staff as part of a cooperative effort. In first week of June, ODFW will direct stream release 400,000 subyearlings at 50 fpp into the Grande Ronde River at Cougar Creek near the Washington border. From these 400,000 subyearlings, 200,000 fish will be AD+ CWT marked/tagged and 200,000 will be unmarked and untagged, (priorities 12 and 14 in Table 3). See also Table 6.

The IPC subyearling program at Irrigon Hatchery will receive eggs from LFH in December. Coded wire tags for this release will be funded by IPC and will have an ODFW Agency prefix. Quality control checks will be completed by WDFW and funded by IPC. PIT tags will be inserted by IPC and WDFW staff as part of a cooperative effort. The IPC group is direct released at the Forest Service boat launch below Hells Canyon Dam at a release goal of 50 fpp. The release target is mid to late May. These fish will be 200,000 AD+CWT and 800,000 AD only (priorities 9, 12, and 15 in Table 3). See also Table 6.

NOAA fisheries has requested 5,000 green eggs and the milt needed to fertilize these. Jills and stray males can be used to meet this need and not impact our current programs. NOAA intends to use the fish for an otolith microchemistry study and all fish will be killed when done.

A total of 201,000 subyearlings are 100% CWT and AD clipped in April by WDFW and are released from LFH into the Snake River in early June. WDFW Staff will insert 20,000 PIT tags into the on-station subyearlings in May. Quality control checks will be completed by WDFW staff.

Captain John Rapids (CJR) Acclimation Facility (AF) receives 501,000 subyearlings in May, as does Big Canyon AF, from LFH. All marking and tagging is completed by WDFW in March and April, prior to transfer. PIT tagging may occur prior to and/or post transfer to acclimation sites. Both groups are comprised of 100,000 CWT, 100,000 AD+CWT, and 300,000 unmarked and untagged fish (Table 6). Pittsburg Landing AF will receive 401,000 subyearlings in May. The Pittsburg Landing group is comprised of 100,000 CWT, 100,000 AD+CWT, and 200,000 unmarked and untagged fish (Table 6). All of these subyearling groups are acclimated and released in late May by NPT at 50 fpp. Quality control checks, PIT tagging, and the purchase of

the PIT tags for fish destined for FCAP facilities, including the second release of subyearlings from CJR described below, will be completed by NPT staff.

An additional 201,000 subyearlings, 100% AD+CWT with 2,000 PIT tags will be transferred to CJR, acclimated and released in early June at 50 fpp (Table 6).

Yearlings

A yearling release of 450,000 fish from LFH directly into the Snake River at 10 fpp is programmed for 2019. All of these fish will be marked and/or tagged during July-August 2018 (225,000 AD+CWT, and 225,000 CWT only), and transferred into Lake Two. A portion of these fish will also be PIT tagged (15,000) approximately 21 days later by WDFW staff. PIT tags will provide improved estimates of escapement of adults through the hydro system to the Snake River, and to estimate SARs. In 2019, these fish will be released over an anticipated 4-day period into the Snake River the first week in April, depending on river flows. Due to the unscreened bypass protocol for lamprey at the McNary Dam, releases shall be coordinated as to not jeopardize survival of juveniles migrating through potentially exposed turbines. Screens are fully in place at McNary Dam by April 15 each year. Since all three lakes share a common release structure, the fall Chinook release will be coordinated with steelhead releases.

Three yearling groups of 152,000 will be marked and/or tagged at LFH in July-August 2018 (AD+CWT; CWT only) then transferred to CJR, Big Canyon, and Pittsburg Landing AF's (at ~ 12 fpp) for final rearing and release by NPT in April 2019 at a target of 10 fpp. Prior to transport, a proportion will be PIT tagged for evaluating emigration timing and survival through the hydro-system. Numbers and availability of PIT tags are to be determined by the funding entities. See Table 6 for proposed disposition of the BY17 yearlings.

Table 6. Proposed BY17 Snake River fall Chinook tagging, transfers and releases.

Site	Transfer Goal	Release Goal	Size (fpp)	Age	Mark/CWT/	PIT Tags	Transfer/Release Date
Irrigon (IPC)	1,100,000	1,000,000	Eyed Eggs	0+	200,000 AD/CWT 800,000 AD Only	1,500 1,500	Dec 2017 (eggs transfer)
Grande Ronde Direct - Irrigon	440,000	400,000	Eyed Eggs	0+	200,000 AD/CWT 200,000 Unmarked	1,500 1,500	Dec 2017 (egg transfer)
NOAA Egg study	5,000	0	Green eggs		None	None	Oct - Nov 2017 (egg transfer)
LFH	N/A	200,000	50	0+	100% AD/CWT	20,000	May – Jun 2018
Capt. John	501,000	100,000 100,000 300,000	75 75 75	0+ 0+ 0+	CWT Only AD/CWT Unmarked	26,000	May – 2018 (transfer)
Big Canyon	501,000	100,000 100,000 300,000	75 75 75	0+ 0+ 0+	CWT Only AD/CWT Unmarked	2,000	May - 2018 (transfer)
Pittsburg Landing	401,000	100,000 100,000 200,000	75 75 75	0+ 0+ 0+	CWT Only AD/CWT Unmarked	26,000	May – 2018 (transfer)
Capt. John 2[a]	201,000	200,000	50	0+	100% AD/CWT	2,000	May 2018 (transfer)
LFH	N/A	450,000	10	1+	225,000 AD/CWT 225,000 CWT	7,500 7,500	April 2019

					Only		
Capt. John	152,000	150,000	13	1+	70,000 AD/CWT 80,000 CWT Only	1,000	Feb - 2019 (transfer)
Pittsburg Landing	152,000	150,000	12	1+	70,000 AD/CWT 80,000 CWT Only	1,000	Mar – 2019 (transfer)
Big Canyon	152,000	150,000	12	1+	70,000 AD/CWT 80,000 CWT Only	1,000	Mar - 2019 (transfer)

[a] As of 2015, the Couse Creek release near CJR has been changed to a late acclimation and release from CJR.

III. TUCANNON SPRING CHINOOK

The Tucannon River Spring Chinook Hatchery production began in 1985 using endemic broodstock. Currently, both natural origin and hatchery supplementation fish are collected for broodstock. Returning adults are collected at the Rainbow Lake Intake and transported to LFH for holding, spawning, hatching and initial rearing. The release goal is 225,000 yearling smolts.

A. Fish on Hand

Brood Year 2016

At the end of August 2017, LFH had 211,833 juvenile spring Chinook on hand.

B. Tagging, Transfers, and Releases

Brood Year 2016

In March 2017, the BY16 progeny were 100% CWT tagged with no fin clip at LFH.

The spring Chinook at LFH will be transferred to TFH in October for final rearing and eventual release from Curl Lake AF in late March/early April (Table 7). At TFH these fish are reared in concrete round ponds or raceways with river water supply, except when well water is added mid-winter to maintain water temperatures near 40^0 F. Checks for CWT retention are conducted prior to transferring the fish to Curl Lake AF in March.

Prior to fish being moved to Curl Lake AF for final acclimation, Biomark Inc. will PIT tag 15,000 fish. We will continue to attempt to determine smolt survival while in Curl Lake by PIT tags detected going out of the lake by means of a PIT tag array that was installed in 2015 on the outlet pipe. To date, results from the PIT array have been limited because of tag collisions and noise between antennas. While fine tuning the PIT tag arrays, a 1% mortality rate will be used for out migrating smolts while they are in the lake.

Table 7. Proposed BY16 Tucannon River spring Chinook tagging, transfers and releases.

Site (Type)	BY16 Transfer Goal	Expected at release	Size (fpp)	Age	Mark/CWT/	PIT Tags	Release Date
Curl Lake AP	210,000	209,000	12	1+	100% CWT	15,000	Mar – Apr 2018

C. Spawning / Outplants

Brood Year 2017

The egg take goal for BY17 is approximately 245,000 green eggs. Seventy-five females are needed to meet the egg take goal at a fecundity of 3,500. We will continue collecting adults for spawning needs until the eggtake goal is met or spawning at the hatchery is done.

A 2 x 2 spawning matrix protocol will be followed for spring Chinook spawning at LFH. During the spawning activity, eggs and milt are collected in individual bags and placed in a cooler until fertilization. Spawning matrices are determined after all fish are spawned, all CWT's are checked for origin, and then fertilization takes place at the spawning building. Fertilized eggs are then brought to the dirty room where they are laid down individually into heath baskets, rinsed and placed into heath stacks to water harden in 100 ppm iodophor for one hour. All pre-spawn mortalities and spawned spring Chinook carcasses are disposed of on site, or will be used for nutrient enhancement in the upper Tucannon River if possible.

Due to high pre-spawn mortality of adults passed above the trap in the Tucannon River in the past, and expected extremely low returns for 2017, agreement has been reached to bring all adults that would be passed above the trap back to LFH to be held until spawning. Due to the extremely low numbers of returning adults, all adults collected were held for broodstock.

D. Rearing

Brood Year 2017

The production goal for BY17 is 225,000 smolts at release (Table 8). Eggs are treated with formalin daily to reduce fungus and are reared in vertical incubation trays. At eye-up, eggs from individual females are shocked, picked and placed in separate trays with vexar screening to simulate substrate. Upon complete yolk-sac absorption (~1600 fpp), they will be transferred to the north side shallow troughs for introduction to feed or ponded directly into raceways on the south side of LFH.

Table 8. Proposed BY17 Tucannon River spring Chinook tagging, transfers and releases.

Site (Type)	BY17 Transfer Goal	Expected at release	Size (fpp)	Age	Mark/CWT/	PIT Tags	Transfer/Release Date
Curl Lake AP	230,000	225,000	12	1+	100% CWT	15,000	Mar – Apr 2019

E. *Trapping*

Brood Year 2018

Trapping for the spring Chinook broodstock program is conducted exclusively at the TFH adult trap, located upstream of TFH and incorporated to the Rainbow Lake Intake. Broodstock collection is permitted up to 170 adults. The proportion of hatchery and natural origin adults incorporated into the broodstock is based on the estimated run size and the Tucannon Spring Chinook HGMP sliding scale (Appendix H) and will be adjusted in-season, if necessary, to meet the 225,000 smolt production goal. One-ocean age (jacks: <61 cm FL) fish may be included in the brood at a rate not to exceed 10% of the adult males during low run years.

Adults collected for spawning are transferred by truck to LFH for holding. Adults will receive 167 ppm formalin treatments every-other day to control fungus and decrease pre-spawning mortality

Depending on the pre-season forecast, experience from past out planting success, and expected environmental conditions in the Tucannon River in 2018, WDFW (with co-manager agreement) may collect and hold some portion of the returning adults that would normally be passed upstream to spawn naturally. WDFW will be doing this due to very low pre-spawning survival of adults passed upstream of the trap in recent years. All held fish will be brought back to LFH and released back into the river just prior to spawning in August 2018. Percentage collected will be dependent upon preseason run forecasts and actual numbers back to the river. Conversations will be ongoing up to and through adult collection.

Staff will pass, or collect for holding, hatchery jacks to mimic the NOR jacks returning to the best of their ability and cull the excess hatchery jacks at the trap. Jacks culled at the adult trap will be utilized for food bank or stream enrichment purposes. On a low male proportion year, we will pass more HOR jacks to help ensure there are enough males on the spawning grounds.

IV. ASOTIN CREEK SPRING CHINOOK

WDFW will be exploring options with the co-managers to implement a spring Chinook program in Asotin Creek using Tucannon River stock. This program would allow for another broodstock source in years of low returns, and would act as a safety net to the Tucannon River population. Much planning still needs to occur, along with ESA consultation with NOAA Fisheries before

such a program can be implemented. WDFW is committed to work with the co-managers over the next year to develop an agreed upon plan.

V. TOUCHET SPRING CHINOOK

WDFW will be bringing a proposal to PAC in January of 2018 to initiate a harvest mitigation program for spring Chinook in the Touchet River. The HGMP for this program has been submitted to NOAA Fisheries for consultation. WDFW will request 275,000 eyed Carson stock eggs from the USFWS for BY18 to produce 250,000 smolts to be released in the spring of 2020. Hatching and rearing will take place at LFH. Fry will be ponded and reared in two of the adult holding ponds until marking and tagging. One-hundred percent of the production will be ad-clipped with components also CWT'd and PIT tagged. Fish will be marked/tagged directly into one of the lakes at LFH, or will be moved to a lake about a month after marking/tagging has occurred. Smolts will be direct stream released into the mainstem Touchet, North Fork, and Wolf Fork rivers (sites to be determined). Currently, releases have been proposed for up to 165,000 in the mainstem Touchet River near Dayton and up to 110,000 in either the upper North Fork and/or Wolf Fork rivers. Descriptions of future broodstock collections, spawning and rearing of this group of fish at LFH will be provided in future AOP's.

VI. SUMMER STEELHEAD - GENERAL

The LFC currently uses two stocks of steelhead in the Snake River basin, (Tucannon and Wallowa) and two stocks in the Walla Walla basin (Touchet and Wallowa). The Wallowa stock is a non-endemic stock that was originally collected from outside their respective release points. The Wallowa stock was originally collected by ODFW from Lower Snake River dams (likely comprised of both A- and B-run fish from Washington, Oregon and Idaho), and then released in the Wallowa River in the Grande Ronde Basin. The Wallowa stock steelhead will be released in the Grand Ronde and Touchet rivers, and on-station at LFH into the Snake River.

The NMFS 1999 Biological Opinion ruled that continued use of Lyons Ferry and Wallowa stocks were causing jeopardy to listed ESU Steelhead populations in the Snake and mid-Columbia rivers. It was recommended by NMFS to convert to endemic stock populations where possible. The Touchet and Tucannon endemic broodstock programs began with the 2000BY, with the original goal of collecting 16 pairs for spawning and a release goal of 50,000 each. Adjustments have been made to the broodstock collections because fecundity and survival values were higher than originally estimated. For various reasons the Tucannon program has been implemented (though not to full production due to limitations in rearing space), but the Touchet program is still under evaluation.

Additional changes to the steelhead program are needed to respond to results from evaluation of fish stock performance and ESA related concerns regarding the ongoing releases of Wallowa stock steelhead into the Snake, Touchet and Grande Ronde rivers. Such changes may require a departure from the general mitigation approach used for steelhead so far, but also will need careful planning to ensure that the change can be implemented within the limits of the hatchery facilities now or as planned to exist in the near future.

Additional infrastructure is needed in order to fully expand the Tucannon River endemic program to the desired 150,000 smolt release level. Statements of Work have been provided to LSRCP to hopefully begin a feasibility study.

VII. TOUCHET SUMMER STEELHEAD

The Touchet River summer steelhead is considered an endemic program. Through BY2014, all production was derived from natural parentage broodstock. With BY2015, WDFW began incorporating hatchery origin returns into the broodstock after agreement from the co-managers. HxW crosses were made by using only female hatchery returns and natural origin males. A four year study will be conducted comparing performance of 100% pNOB against 50% pNOB groups. Broodstock adults are trapped on the Touchet River at the Dayton AF intake structure and transferred to LFH for holding and spawning. Historically progeny have been planted in the North Fork of the Touchet River as yearlings each spring. Starting in BY15, smolts were trucked to the Dayton AF and allowed 10 to 14 days to acclimate with the Wallowa stock at the time the volitional release began. At the end of the acclimation period, the remaining fish will be forced out to the Touchet River. All adults trapped and handled are anesthetized by electronarcosis (EN).

A. Fish on Hand

Brood Year 2017

At the end of August 2017, LFH had approximately 52,535 Touchet River summer steelhead juveniles on hand. 30,941 of these are HxW crosses and 21,594 are WxW crosses. The non-equal split is due to differences of age and fecundity of females used for broodstock in each group.

B. Tagging, Transfers, and Releases

Brood Year 2017

In August, all Touchet River endemic stock steelhead were CWT tagged, with no external fin clips, thereby making them unsusceptible to sport fisheries. Smolts will be put into the Dayton AF and allowed to comingle with the Wallowa stock and then volitionally outmigrate with the Wallowa stock.

Table 9. Proposed BY17 Touchet summer steelhead smolts tagging, transfers and releases.

Site	BY17 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/	PIT Tags	Transfer/Release Date
WxW-Touchet River (Dayton AF)	25,000	30,000	4.5	1+	100% CWT	5,000	April 2018
HxW - Touchet River (Dayton AF)	25,000	21,500	4.5	1+	100% CWT	5,000	April 2018

C. Trapping

Brood Year 2018

Trapping of BY18 Touchet River endemic stock will begin in January or February (depending on seasonal weather) at the Dayton AF adult trap (located adjacent to the pond intake) and is generally completed by early May. WDFW evaluation staff checks the trap daily, using EN to calm the fish for handling, transferring only a portion of unmarked natural origin adults and tagged hatchery origin adults to LFH based on broodstock needs. All trapped Wallowa stock fish are: 1) transferred to the Dayton Juvenile Fishing Pond to remove them from the river and provide additional fishing opportunities within Dayton, 2) sacrificed for CWT retrieval, and/or 3) donated to a local food bank.

Current survival estimates indicate that 14-15 spawned females (depending on age structure) should provide enough eggs to meet the smolt production goal (Table 11). Per co-manager agreement, WDFW evaluation staff target collecting 16 females and 20 males for the broodstock (75% natural origin and 25% hatchery endemic origin), with all other natural origin and hatchery endemic origin fish passed upstream for natural spawning. A minimum of five spawned females are needed for each production cycle to occur. An additional 5,000 PIT tags are being purchased through the Walla Walla Monitoring Project (BPA #2000-039-00) to provide a total of 10,000 PIT tags to monitor adult returns on WxW and WxH crosses.

D. Spawning

Based on fecundity and survival estimates, LFH typically spawns 14-15 females to provide 65,000 green eggs for the program. Up to 60,000 smolts may be reared full cycle and planted as yearlings in the spring. Fish in excess of 60,000, will be planted into the Touchet River as fingerlings in the fall. Spawning usually occurs in March and April. A matrix-type spawning protocol is employed, (2x1; two males to every female), to increase the effective breeder population (N_b) due to the relatively small founding population for this program. If not enough males are ripe to achieve this goal; 1:1 spawning is employed.

E. Rearing

After spawning, fertilized eggs are water hardened in 100 ppm iodophor. They are incubated in down-welling iso-incubation buckets (one fish per bucket). Once virology sampling has confirmed no viruses are present, the eyed eggs are shocked, ran through an automated egg sorting machine or handpicked and enumerated, and placed in hatching baskets suspended over shallow troughs. After hatch and swim-up, they are introduced to feed, and transferred to intermediate raceways at around 500 fpp in June. They are transferred again to outside raceways at roughly 200 fpp in July.

Table 10. Proposed BY18 Touchet summer steelhead smolts tagging, transfers and releases.

Site	BY18 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/	PIT Tags	Transfer/Release Date
WxW-Touchet River (Dayton AF)	25,000	25,000	4.5	1+	100% CWT	5,000	April 2019
HxW - Touchet River (Dayton AF)	25,000	25,000	4.5	1+	100% CWT	5,000	April 2019

VIII. TUCANNON SUMMER STEELHEAD

The Tucannon River summer steelhead program is considered an endemic program, meaning all production is derived from natural parentage, or from 1st generation hatchery reared endemic stock fish. The adults for this program are collected at TFH and their progeny planted in the upper Tucannon River as yearlings. Current release goal is 150,000 smolts at 4.5 fpp, with 50,000 smolts being released for the conservation portion of the program (unclipped) and 100,000 smolts being released for the mitigation portion (ad-clipped) of the program. According to the Tucannon Steelhead Program broodstock sliding scale, The 50,000 smolts for the conservation portion will come from NOR's and endemic returns. The 100,000 smolts for the mitigation portion will come from hatchery endemic returns and ad-clipped/cwt adults for at least another year. In the future, ad-clipped or ad/cwt adults will be chosen and used at a lower priority due to the other ad-clipped hatchery strays at the TFH adult trap.

A. Fish on Hand

Brood Year 2017

As of the end of August 2017, LFH had an estimated 123,805 Tucannon River summer steelhead juveniles on hand. 55,707 fish for the conservation program and 68,098 fish for the mitigation program. There was an unanticipated higher than normal eyed egg mortality on this group. This additional loss resulted in additional females being trapped and spawned to get as close to production numbers as possible, and still came up short on green eggtake.

B. Tagging, Transfers, and Releases

In September, all Tucannon River endemic steelhead for the conservation portion of the program will be coded wire tagged only. The mitigation portion of the program will be 100% ad-clipped

with 25,000 also receiving a CWT. In February-March 2018, the conservation group fish (50,000) will be moved to the TFH where they will be reared until release as yearlings in April or early May from Curl Lake AF. Prior to 2016, releases have been roughly five miles upstream of the TFH, just below the Curl Lake intake structure. Beginning in 2016, WDFW staff began transferring the smolts into Curl Lake after the spring Chinook were released. This release method is expected to continue into the future. The group marked for harvest mitigation will be full term reared at LFH and released at Marengo Bridge in April or early May, depending on size. A total of 15,000 fish will be PIT tagged prior to release (Table 11).

Table 11. Proposed BY17 Tucannon summer steelhead smolts tagging, transfers and releases

Site	BY17 Goal	Expected at release	Size (fpp)	Age	Mark/CWT	PIT Tags	Transfer/Release Date
Tucannon River at Curl Lake	50,000	55,000	4.5	1+	100% CWT Only	7,500	April 2018
Tucannon River (Marengo Bridge)	100,000	65,000	4.5	1+	25,000 AD/CWT 40,000 AD Only	7,500	April 2018

C. Trapping

Brood Year 2018

Trapping of BY18 Tucannon River endemic stock will begin in February (depending on seasonal weather) at the Tucannon FH adult trap (located adjacent to the Rainbow Lake Intake) and is generally completed by mid-May. Tucannon FH staff check the trap daily, transferring only a portion of unmarked natural origin adults, or tagged hatchery origin adults to LFH based on broodstock needs.

Current survival estimates indicate that 35-38 spawned females (depending on age structure) will provide enough eggs to meet the current smolt production goal. WDFW will target 40 to 42 females to be brought to the hatchery for broodstock needs. Any females not used will be returned to the river to spawn naturally. Per co-manager agreement, a pre-season estimate based on PIT tag returns on the number natural origin fish expected at the TFH adult trap will be made. Per the Tucannon Steelhead Broodstock Sliding Scale (Appendix X), the appropriate number of natural and hatchery origin fish will be collected for either the conservation or mitigation broodstock.

Following the low return of BY08, managers agreed that should low production numbers (i.e., less than 20,000 fish at smolt release, ~5 females at trapping) occur in the future, the fish will not be reared full term, but released as parr/fingerlings in the upper Tucannon River. Less than 20,000 fish production would not allow enough fish for evaluations to occur.

D. Spawning

Based on fecundity, survival estimates, and potential IHN positive females, LFH typically spawns 35-38 females to provide 180,000 green eggs to meet the current conservation and harvest program release goals (Table 13). Spawning occurs in March and April. Matrix spawning is employed due to the relatively small founding population for this program. The intent of this protocol is to spawn two males with each female, increasing genetic diversity and helping ensure successful fertilization of eggs. If not enough males are ripe to achieve this goal; a 1:1 spawning matrix is employed.

E. Rearing

After spawning, fertilized eggs are water hardened in 100 ppm iodophor. They are incubated in down-welling iso-incubation buckets (one fish per bucket). Once virology sampling has confirmed no viruses are present, the eyed eggs are shocked, ran through an automated egg sorting machine or handpicked and enumerated, and placed in hatching baskets suspended over shallow troughs. After hatch and swim-up, they are introduced to feed, and transferred to intermediate raceways at around 500 fpp in June. They are transferred again to outside raceways at roughly 200 fpp in July. The implementation of AD clipping of the Tucannon hatchery endemics begins at a hatchery production of 75,000 or larger, with 50,000 to remain unmarked at all production levels.

Table 12. Proposed BY18 Tucannon River summer steelhead production.

Site	BY18 Goal	Size (fpp)	Age	Mark/CWT/	PIT Tags	Transfer/Release Date
Tucannon River (at Curl Lk.)	50,000	4.5	1+	100% CWT Only	**7,500**	April 2019
Tucannon River (Marengo Bridge)	100,000	4.5	1+	25,000 AD/CWT 75,000 AD only	**7,500**	April 2019

IX. WALLOWA SUMMER STEELHEAD

The Wallowa stock program was initiated to provide a fishery for summer steelhead in the Grande Ronde River (for both Oregon and Washington anglers), and contribute to both tribal, and sport fisheries in the mainstem Columbia and Snake rivers. The overall production of this stock was increased in December 2012, following the elimination of the Lyons Ferry stock steelhead program, and now produces steelhead that are released in the Touchet River from the Dayton AF (100,000), Grande Ronde River from the Cottonwood AF (225,000) and into the

Snake River at Lyons Ferry (60,000-160,000 depending on Tucannon Endemic stock production). Previous to the 2012 decision, Wallowa production was only used in the Grand Ronde, (200,000). Lyons Ferry stock was used in the Touchet, (85,000), Walla Walla, (100,000) and for on-site release, (160,000).

A. Fish on Hand

Brood Year 2017

As of the end of August 2017, LFH had 412,137 Wallowa stock summer steelhead juveniles on hand. Due to extremely high runoff this past spring, only a couple dozen females were collected at the Cottonwood trap. As one of our alternate options, we started the trap at LFH and trapped Wallowa stock adults there. Approximately 120 females were spawned from the trap at LFH to make program needs. 183,203 extra juveniles were planted into Rock Lake in August after marking and tagging was completed to meet program needs.

B. Tagging, Transfers, and Releases

Brood Year 2017

All of these fish were 100% adipose fin clipped into Lakes #1 and #3 in August, 2017. A portion of the fish will be CWT'd and held in raceways until transfers (Dayton and Cottonwood). (Table 13). A portion of each release group will be PIT tagged just prior to release. In February 2018, 165,000 smolts from one of the Lakes and the 20,000 AD/CWT group will be transferred to the Cottonwood AF for final rearing and released into the Grande Ronde River. The fish will reared/acclimated at Cottonwood AF for approximately 2.5 months and then volitionally releases. Another 40,000 will be transferred to the Wallowa Hatchery as part of a release study being conducted by WDFW and ODFW. Another 40,000 will be transferred from Irrigon Hatchery to Cottonwood AF as the second half of the release study, (please see the release study sent out with the 2014/2015 AOP). A total of 6,000 juveniles will be PIT tagged by WDFW for Cottonwood AF prior to release in April; 2,000 of those PIT tags will be used as part of the Comparative Survival Study (CSS) for steelhead production above LGR (Fish Passage Center). Due to the change in programs for BY2017, an excess of 183,000 fry were planted into Rock Lake so as not to exceed program goals.

Also in February 2018, 80,000 from Lake #1 and the AD/CWT group of 20,000 will be transferred to the Dayton AF. They are reared for approximately 2.5 months, with volitional release into the Touchet River completed by mid-to the end of April 2018. Thru the US v OR process, the Walla Walla direct release has been discontinued. The final remaining fish from Lake #1 will be released directly from LFH into the Snake River in mid-April. The CWT group for the on-station release group has also been discontinued. Monitoring of this group will be done solely on PIT tags, which have been increased from historic tagging levels. Each of the above release group will have representative PIT tagging.

Table 13. Proposed BY17 Wallowa stock summer steelhead tagging, transfers and releases.

Site	BY17 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
Cottonwood AF on the Grande Ronde River	166,000 20,000	165,000 20,000	4.5	1+	AD Only AD/CWT	3,000* 3,000*	Transfer to Cottonwood AF in Feb from LFH, release in April 2018
	15,000 25,000	15,000 25,000	4.5 4.5	1+ 1+	AD Only Ad/CWT	4,000	Transferred from Irrigon hatchery.
Cottonwood AF Total	225,000	225,000	4.5	1+	AD Only AD/CWT	10,000	Combined for all groups
Dayton AF on the Touchet River	81,000 20,000	80,000 20,000	4.5	1+	AD Only AD/CWT	0 3,000	Transfer to Dayton AF in February 2018 for release in April
Snake River (On site at Lyons Ferry)**	60,000	60,000	4.5	1+	AD Only	6,500	On station release in mid-April 2018.
Wallowa Hatch. (from LFH)	40,000	40,000	4.5	1+	AD Only	4,000	Transfer to Wallowa Hatchery in Feb. from LFH, release in April 2018

*2,000 of these PIT tags are part of the CSS study from the Fish Passage Center

** Per the US v OR agreement: The on-station release at Lyons Ferry will vary from 60,000-160,000 related to smolt production targets for the Tucannon River so that the total program equals 210,000 (e.g., 100,000 Tucannon + 110,000 on-station at Lyons Ferry).

C. Trapping

Brood Year 2018

Trapping of returning Wallowa stock adults occurs on Cottonwood Creek (a small tributary to the Grande Ronde River) March through April. This creek also supplies water to the Cottonwood AF. Because of potential low egg survival and/or IHN virus (both of which have been experienced in recent years), about 110 complete spawned females are needed to provide 475,000 green eggs for the program of 385,000 smolts (Table 15). All unmarked (presumably natural origin) steelhead captured in the Cottonwood Creek adult trap are passed upstream to spawn naturally**.** All spawned carcasses not considered good quality for food banks will be returned to LFH for burial. If low water flow in the creek does not allow returning adults access to the trap, three alternate strategies may be employed: 1), release juveniles early and begin

trapping adults, 2) collection of broodstock at Big Canyon or the Wallowa Hatchery may occur and 3) trap at LFH. Surplus hatchery origin adults are removed from the creek at the trap to reduce the potential impacts of IHN to the spawning population and to juvenile hatchery fish being held in the AF. Options for disposition of excess fish (Wallowa Stock HGMP) include 1) killed to collect any CWT fish, 2) offered to local food banks, or 3) killed outright to prevent hatchery swamping of natural origin spawners and hauled to LFH to be buried. Each of these will be explored annually for best use of the excess fish.

D. Spawning

Spawning generally occurs in late March and early April on a weekly basis. All fish are spawned at the Cottonwood Creek trap site, with the gametes transported to LFH for fertilization, incubation and rearing. A 1:1 male to female mating ratio will continue to be employed whenever possible (see research section below). Excess adults from ODFW's Wallowa Hatchery or Big Canyon site may be used to provide eggs for this program, as occurred in 2005, 2009, 2010 and 2011, and 2015.

E. Rearing

After spawning, fertilized eggs are water hardened in 100 ppm iodophor. They are incubated in down-welling iso-incubation buckets (one fish per bucket). Once virology sampling has confirmed no viruses are present, the eyed eggs are shocked, ran through an automated egg sorting machine or handpicked and enumerated and placed in hatching baskets suspended over shallow troughs. After hatch and swim-up, they are introduced to feed, and transferred to outside raceways at roughly 500 fpp in June.

Table 14. Proposed BY18 Wallowa stock summer steelhead tagging, transfers and releases.

Site	BY18 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
Cottonwood AF on the Grande Ronde River	206,000 20,000	205,000 20,000	4.5	1+	AD Only AD/CWT	3,000 3,000	Transfer to Cottonwood AF in Feb from LFH, release in April 2019
Dayton AF on the Touchet River	81,000 20,000	80,000 20,000	4.5	1+	AD Only AD/CWT	0 3,000	Transfer to Dayton AF in February 2019 for release in April
Snake River (On site at Lyons Ferry) *	60,000	60,000	4.5	1+	AD Only	6,500	Direct stream release in mid-April 2019

*Per the US v OR agreement: The on-station release at Lyons Ferry will vary from 60,000-160,000 related to smolt production targets for the Tucannon River so that the total program equals 210,000 (e.g., 100,000 Tucannon + 110,000 on-station at Lyons Ferry).

X. SPOKANE RAINBOW TROUT

Rainbow trout are reared and planted in both southeast Washington and northwest Idaho to meet LSRCP mitigation goals in both states for lost fishing opportunities as a result of construction and operation of the lower Snake River dams. The original LSRCP goal was 93,000 lbs. However, the WDW determined that in stream habitat improvements, equivalent to the cost of producing 7,000lbs annually of hatchery trout, was a reasonable exchange, and that was implemented in 1983, which reduced the annual production goal to 86,000lbs for the Snake River Basin. The SE Washington production goal is 79,000lbs and the NW Idaho production goal is 7,000 lbs. A small, privately funded program (Tri-State Steelheaders, TSS) at the TFH rears rainbow to1.5 pounds each, providing a unique fishing opportunity in local lakes. This locally funded program replaced the previously state funded program in 2011 which had been in place since the LSRCP took ownership of the Tucannon Hatchery. The agreement at that time was that the state funded program would be allowed to continue at the TFH.

A. Fish on Hand

Brood Year 2016

At the end of August 2017, LFH and TFH had a combined total of approximately 249,548 Spokane stock rainbow trout on hand, this includes diploids and triploids. At the time of fish splits and plants in the fall of 2017, staff will determine the exact overage and plant the excess fish into area lakes at the recommendation of fish management. LFC will keep approximately 5% over release goals in the fall to accommodate for mortality and predation.

B. Tagging, Transfers, and Releases

The IDFG fall catchables will be planted in the Moose Creek Reservoir by IDFG staff in late September or early October 2017. All fish for IDFG are triploids from the Spokane stock rainbow trout. Refer to Table 15. Proposed BY 2016 Spokane rainbow trout tagging, transfers and plants for the 2017-18 proposed planting allotment**.**

In spring 2018, 74,000 catchable (2.5 fpp) and 1,000 jumbos (1.5 lbs. each) will be planted by LFH staff into various lakes in southeast Washington. Spring planting begin in February and are completed in early April.

At the TFH, the goal is to plant 94,000 rainbow trout into various lakes in southeast Washington as catchables (2.5 fpp average.). Planting typically begin in April and are generally completed by the end of June. The jumbo trout from TSS program (usually around 4,000) are planted February through May each year, supplementing catchable plants. No Spokane stock rainbow trout are tagged or fin clipped at LFH or TFH.

Table 15. Proposed BY 2016 Spokane rainbow trout tagging, transfers and plants

Facility	BY16 Goal	Expected at release	Size (fpp)	Lbs.	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
Lyons Ferry	16,000	16,000	3.0	5333	1	None	None	Transfer to and planted by IDFG in Sept/Oct 2017
	32,500	47,500	3.0	9,833	1	None	None	Planted in early Oct 2017
	74,000	74,000	2.5	29,600	1+	None	None	Planted in Feb-Apr 2018
	1,000	1,000	0.67	1,493	1+	None	None	Planted in Feb-Apr 2018
	1,650	1,700	1.0	1,650	1+	None	None	Transfer to and planted by NPT in Mar-May 2018
Tucannon	94,000	105,348	2.5	37,600	1+	None	None	Planted in Mar-June 2018
	4,000	4,000	0.67	6,119	1+	None	None	Planted in Feb-May 2018

C. Rearing

Brood Year 2017

Eggs for Washington's legal and jumbo programs, along with Idaho's fall catchable plants come from WDFW's Spokane Hatchery (Spokane stock). WDFW managers completed an Inland Trout Stocking Plan in 2012 for all hatcheries and water bodies in Washington. The management strategy is to plant larger catchables (2.5 fpp) at reduced numbers. Total pounds reared were not affected (Table17).

Approximately 65,000 eyed triploid rainbow eggs for IDFG, NPT and the WDFW Rock Lake fall plant will be transferred from the Spokane Trout Hatchery to LFH in December. After trough rearing, they are transferred to outside standard raceways in March. In January, LFH will receive about 91,500 eyed Spokane diploid rainbow eggs for the balance of its catchable and jumbo program. Early rearing is conducted in either shallow troughs or intermediate raceways before transfer to outside standard raceways in April.

The Tucannon Hatchery will receive about 125,000 eyed rainbow eggs in January. Of these, 94,000 will be destined for planting as catchables (2.5 fpp) and 4,000 are destined for planting as jumbos (1.5 pounds each). After receiving these eggs in January, a small portion (1,750) is transferred from TFH to regional education programs, now privately funded by the TSS club. The catchable program group is started in shallow troughs, intermediate reared in outside round tanks and final reared in the earthen rearing pond. The jumbos start in shallow troughs as well

and finish in the round tanks. The entire jumbo program at TFH is privately funded by the TSS organization.

Table 16. Proposed BY 2017 Spokane rainbow trout releases.

Site	Number	Size (fpp)	Lbs.	Age	Mark/CWT/ Elastomer	Pit Tags	Transfer/release Date
SE Washington Lakes	32,500 165,000 1,000 4,000*	3.0 2.5 1.5 lbs. ea. 1.5 lbs. ea.	9,833 67,200 1,493 5,970*	1 1+ 1+ 1+	None None None None	None None None None	Planted in early October 2018 Planted in February through June 2019
IDFG	16,000	3.0	5,333	1	None	None	Transfer to and planted by IDFG in Sept/Oct 2018
NPT	1,650	1.0	1,650	1+	None	None	Transfer to and planted by NPT in Mar-May 2019

*NOTE; Jumbo trout from TSS funding. Total numbers and/or pounds not included in mitigation.

XI. RESEARCH

WDFW (Fish Management or Fish Science staff) are involved in a variety of research, monitoring and evaluation projects throughout SE Washington. Funding of these activities comes from a variety of sources and many are not directly related to the LSRCP Lyons Ferry/Tucannon Annual Operations Plan, but are provided here in general context for the co-managers so they are aware of activities. Some of the below activities are covered under the RM&E Statement of Work submitted to LSRCP under the hatchery evaluation program.

Fall Chinook

1) WDFW is currently partnered with NPT on a fidelity and fall back radio telemetry study on hatchery fall Chinook released at various locations within the Snake River Basin. To date, preliminary results have been presented at fall Chinook coordination meetings, with tagging to continue in the fall of 2017. Results from this study will help inform future releases of fall Chinook in the Snake River basin. (BPA)
2) WDFW currently conducts fall Chinook spawning ground surveys in the Tucannon River to document abundance, distribution, and origin of spawners. Coho salmon redds are also estimated during these surveys. (LSRCP)
3) WDFW operates a smolt trap on the lower Tucannon River for estimating natural origin salmonid smolt production (spring Chinook, fall Chinook, and summer steelhead). Annually, up to 1,000 fall Chinook have been PIT tagged for outmigration monitoring. PIT tagging of fall Chinook at the smolt trap will be discontinued in 2018. (LSRCP)
4) Beginning in the fall of 2016, WDFW will again collect fecundity samples from fall Chinook spawned at Lyons Ferry. With PBT being able to distinguish between hatchery

and natural origin fall Chinook, a subsample of individual females will be sampled at eye-up so fecundity by origin (hatchery [yearling or subyearling] or natural) can be documented. WDFW has previously documented differences in fecundity and egg size between origins of Tucannon River spring Chinook. It's unknown if similar results will be found with fall Chinook. (LSRCP)

Spring Chinook

1) Due to the recent history of high pre-spawn mortality for Tucannon River spring Chinook salmon and the 2015 drought conditions, it was agreed that a portion of the returns to the TFH adult trap be kept at LFH for adult out planting in late August. A similar decision was reached for 2016, and all adults were again collected for outplants. Outplant success between the two years varied considerably (>90% in 2015, ~60% in 2016). Due to the expected low returns in 2017, again all fish have been collected and held at Lyons Ferry. It's unknown at this time if any fish will be available for outplants. (LSRCP)
2) TFH vs LFH rearing: A study was initiated a few years ago to determine if survival could be increased, and straying above LGR might be decreased, if fish were reared full term at TFH. Initial results from PIT tags (incomplete brood returns) do not indicate any such advantage of rearing fish full term at TFH at this point. (LSRCP)
3) Over-winter survival and habitat utilization in the Tucannon River. Continuation of a study started a few years ago on natural origin spring Chinook and steelhead in the Tucannon River. Data derived will inform life-cycle models, and may better direct habitat actions within the basin which are primarily being done to increase survival and production of spring Chinook. For the fall of 2017, ~1,000 to 1,500 spring Chinook (~2% of the expected natural juvenile production), and 2,500 summer steelhead (Age 1+) will be PIT tagged from geographically stratified sites within the Tucannon River. Collecting fish for PIT tagging occurs through electrofishing. (Washington State Salmon Recover Fund)
4) WDFW currently conducts spring Chinook carcass and spawning ground surveys in the Tucannon River to document pre-spawn mortality, abundance, distribution, and origin of spawners. Surveys are also used to estimate total returns to the river. (LSRCP)
5) WDFW operates a smolt trap on the lower Tucannon River for estimating natural origin smolt production (spring Chinook, fall Chinook, and summer steelhead). Annually, up to 5,000 spring Chinook are PIT tagged for juvenile outmigration and adult return monitoring. (LSRCP)
6) WDFW conducts spring Chinook redd surveys (as needed) in the Touchet River to document spawning from adult outplants by CTUIR in the North Fork and Wolf Fork of the Touchet River. (BPA, WDFW State Funds)
7) WDFW had conducted spring Chinook redd surveys in Asotin Creek to document spawning. These surveys have been discontinued at this time, but would re-initiated if a spring Chinook re-introduction program were to begin in Asotin Creek. The average number of redds in Asotin Creek from 1984-2016 was 3.1 redd/year. (LSRCP)
8)

Summer Steelhead (by basin)

Asotin Creek:

1) WDFW operates adult weirs for summer steelhead in the Asotin Creek population. Current trap locations include Asotin Creek, George Creek, and Alpowa Creek. Ten Mile and Couse creeks are currently not operated due to budget constraints. The weirs are used to estimate natural and hatchery origin abundance at all locations, and for collection of biological samples of returning steelhead for population age and genetic structure. (BPA)
2) WDFW operates a smolt trap in the mainstem of Asotin Creek (below the Asotin Creek and George Creek weirs) for estimating natural origin smolt production (primarily summer steelhead, but spring/fall Chinook are also captured) from the basin. Annually, up to 3,500 summer steelhead are PIT tagged for juvenile outmigration and adult return monitoring. (BPA)
3) WDFW is partially funded by the Asotin Creek Intensively Monitored Watershed (IMW) for juvenile sampling in the upper basin, some hook/line sampling and PIT tagging of summer steelhead, and maintenance/operation of PIT Tag arrays within the Asotin Creek basin that are part of the IMW study. (Pacific Salmon Coastal Fund, WA State Salmon Recovery Fund).

Small Snake River Tributaries:

1) WDFW operates adult weirs (rotating panel selection) of small tributaries located between the mouth of the Tucannon River and Lower Granite Dam. Currently, these tributaries have been designated as part of the Tucannon or Asotin populations. The weirs are used to estimate natural and hatchery origin abundance at all locations, and for collection of biological samples of returning steelhead for population age and genetic structure. A genetic study is currently being conducted to determine if, which of, and how, these small tributaries should be assigned to the Tucannon or Asotin steelhead populations based on genetic similarity. The final results of this analysis are still pending. (BPA)

Touchet:

1) A paired release study is currently being performed utilizing 10,000 PIT tags to monitor the success of WxW or WxH crosses in the Touchet Endemic steelhead program. Fish will be tagged in January by WDFW staff, 5,000 WxW crosses and 5,000 WxH crosses (to compare survival differences to adult return). This study will be conducted for four years. Releases of these two study groups will be from the Dayton Acclimation pond. Smolts will comingle with the Wallowa stock and both groups will volitional out of the acclimation pond at the same time. First year of release was in 2016. First adult returns are expected to return in the fall of 2017. (LSRCP, BPA, - Walla Walla Monitoring Project)

2) WDFW operates a smolt trap on the lower Touchet River for estimating natural origin smolt production (primarily summer steelhead, but spring and fall Chinook have also been captured/documented). Annually, we target 4,000 (or more) summer steelhead to PIT tagged for juvenile outmigration, estimating adult returns, and overshoot monitoring. (WA State Salmon Recovery Fund – Fish In/Fish Out Projects, BPA – Walla Walla Monitoring Project, LSRCP)
3) WDFW operates adult steelhead traps on Coppei and Patit creeks to monitor abundance of natural and hatchery origin spawners, and collection of biological samples for age composition. (Walla Walla Monitoring Project – BPA)
4) WDFW currently conducts summer steelhead spawning ground surveys in the Touchet River basin (locations above Dayton and Coppei Creek) and Walla Walla (Mill Creek) to estimate abundance and distribution of spawners. (LSRCP, BPA – Walla Walla Monitoring Project)
5) WDFW operates and maintains a series of PIT tag arrays (Harvey Shaw, Bolles, Coppei, Patit, and Dayton), for monitoring adult steelhead (hatchery and wild) returns to the basin. (BPA – Walla Walla Monitoring Project)

Tucannon:

1) WDFW operates a smolt trap on the lower Tucannon River for estimating natural origin smolt production (spring Chinook, fall Chinook, and steelhead). Annually, we target 2,500 summer steelhead (or more) for PIT tagging for adult return estimation and overshoot monitoring. (LSRCP, BPA – PIT Tags for Steelhead only)
2) WDFW currently conducts summer steelhead spawning ground surveys in the upper Tucannon River only (and Cummings Creek) to estimate abundance of spawners in correlation with fish passed at the Tucannon adult trap. (BPA)
3) WDFW operates and maintains a series of PIT tag arrays (Lower Tucannon, Middle Tucannon, Upper Tucannon, Tucannon FH), for monitoring adult steelhead (hatchery and wild) returns and distribution throughout the basin. Arrays are also used for adult spring Chinook and bull trout monitoring, and contribute information to the spring Chinook life-cycle model effort described above. (BPA, LSRCP)
4) Over-winter survival and habitat utilization in the Tucannon River. Continuation of a study started a few years ago on natural origin spring Chinook and steelhead in the Tucannon River. Data derived will inform life-cycle models, and may better direct habitat actions within the basin which are primarily being done to increase survival and production of spring Chinook. For the fall of 2017, ~1,000 to 1,500 spring Chinook (~2% of the expected natural juvenile production), and 2,500 summer steelhead (Age 1+) will be PIT tagged from geographically stratified sites within the Tucannon River. Collecting fish for PIT tagging occurs through electrofishing. (FY18 may be the last year). (Washington State Salmon Recovery Fund)

Grande Ronde:

1) See additional document sent with the 2014/2015 AOP, Wallowa Stock rearing/acclimation study proposed by WDFW and ODFW: *A Survival and Straying Comparison of Wallowa Stock Steelhead Reared at WDFW's Lyons Ferry and ODFW's Irrigon Fish Hatcheries.* This study is examining survival and stray rate differences from summer steelhead reared at either Irrigon Fish Hatchery or Lyons Ferry Fish Hatchery. Groups from each rearing facility were transferred to either Wallowa Hatchery or Cottonwood Acclimation for release. At Cottonwood, both CWT's and PIT's will be used to evaluate the groups, while at Wallowa Hatchery, just PIT tags will be used for comparisons. First release of this study occurred in the spring of 2015, with 1-salt returns occurring for the 2016 run year. Based on 1-salt returns only from the 2016/17 run year, for the fish released at Cottonwood, the WDFW reared fish survived 2.8 times better (to Bonneville) and 3.2 times better (to Lower Granite) than those reared at Irrigon Hatchery and released at Cottonwood. Based on 1-salt returns only from the 2016/17 run year, for the fish released at Wallowa Hatchery, the WDFW reared fish survived 2.1 times better (to Bonneville) and 2.0 times better (to Lower Granite) than those reared at Irrigon Hatchery and released at Wallowa Hatchery. Differences in stray rates from these groups from either release location have yet to be examined. (LSRCP)

   BY17, released in the spring of 2019, will be the last year of this study.

XII. FISH HEALTH

A. Guiding Policies

All fish production at LFH is conducted according to the Salmonid Disease Control Policy of the Fisheries Co-Managers of Washington State and Integrated Hatchery Operations Team (IHOT) fish health policy. Specifically, all lots of fish are monitored for fish health, all broodstock are inspected annually, strict hatchery sanitation procedures and fish culture practices (rearing criteria) are followed, and egg and fish transfer and release requirements are met. The attending aquatic veterinarian will respond to all fish disease outbreaks and oversee fish health-related services. Bacterial kidney disease (BKD) management for Chinook stocks, imposed by Idaho and Oregon state agencies' transfer policies, is outlined in Section C.

B. Monitoring

The aquatic veterinarian will regularly visit LFH and TFH to inspect stock, address mortality events, and provide consultation per their discretion and as needed to maintain a veterinary client patient relationship (VCPR). During site visitations, any fish cohorts exhibiting clinical signs, morbidity, and/or abnormal mortality may be examined by the veterinarian; approximately five to ten fish of each species may be sacrificed for necropsy. Updated mortality records, loading forms, and treatments logs will be provided to the veterinarian upon their request Copies of fish health reports, veterinary feed directives (VFDs), and prescriptions referencing fish at each respective hatchery will be keep on file on site for at least three years.

At spawning, all broodstock will be tested for viral pathogens. Samples of ovarian fluid from 60 females and kidney/spleen tissue from 60 adults of either sex will be submitted for testing. Samples will be pooled into groups of up to five individual fish. In the event that 60 female fish cannot be obtained, all eligible fish from the population will be sampled (i.e. steelhead stocks for the Tucannon and Touchet). Standard hatchery practices of egg disinfection and use of pathogen-free rearing water during early rearing are considered sufficient fish health measures for the control of viral pathogens, including infectious hematopoietic necrosis virus (IHNV).

To comply with Idaho's fish import regulation, a 60 fish sample of kidney/spleen from rainbow trout will be tested for viral pathogens four to six weeks before transfer. Upon completion, results will be communicated to IDFG.

C. Specific Fish Health Management

1. BKD Management – Fall Chinook

Starting with BY16, all females spawned at Lyons Ferry will be 100% tested using ELISA. This is to allow more flexibility in shipping eggs and also for using fry for either yearling or subyearling programs.

WDFW categorizes BKD-ELISA optical densities as follows:

- Below-low = < 0.11,
- Low = 0.11 to 0.199,
- Moderate = 0.20 to 0.44,
- High = 0.45 or greater.

Progeny of negative (below low) females will be selected for the yearling fall Chinook program. Eggs from below low and low females will be selected for shipment to the states of Oregon and Idaho. ODFW has agreed to perform the sampling and testing on 150 females at LFH during spawning. WDFW takes the remaining samples, with a portion of the ELISA testing paid for by IPC (350 females/season). Progeny of all low, moderate and high BKD-ELISA females may be utilized in the subyearling fall Chinook program for WDFW releases and FCAP.

2. BKD Management – Spring Chinook

Starting with BY17, all pre-spawning antibiotic injections intended for 1) the control of adult mortalities associated with *Renibacterium salmoninarum* and/or 2) the mitigation of vertical transmission of *R. salmoninarum* to progeny have been suspended until an evidence-based risk of disease, confirmed by necropsy findings and appropriate ancillary testing, and which reasonably threatens the welfare of the broodstock program, has been established. The commencement of any therapeutic intervention, including the type and dosing regimen of the drug used, will be determined by the attending veterinarian. Pre-spawning female spring

Chinook will be evaluated for BKD-antigen via ELISA assay and indexed according to the resulting value. (Refer to WDFW categorizes of optical densities under section C. 1. "BKD Management of Fall Chinook"). The following culling program is intended to minimize bacterial load within the population and reduce risk of infection:
Until the ELISA results are known, eggs from individual females will be incubated separately. Egg reductions required to meet production targets will begin with the highest ELISA range and proceed downward by range until the production target is met. If possible, all eggs from adults with an ELISA value of 0.44 or higher will be culled from the program. If it is determined that all eggs must be kept to meet program requirements, and space is available, groups with ELISA readings above 0.44 may be segregated and reared separately. No segregation between production groups with ELISA readings below 0.44 will occur. Preferably, only the eggs from females with the lowest ELISA values will be kept for the program.

3. Summer Steelhead

At spawning, all broodstock will be tested for viral pathogens. Samples of ovarian fluid from 60 females and kidney/spleen tissue from 60 adults of either sex will be submitted for testing. Samples will be pooled into groups of up to five individual fish. In the event that 60 female fish cannot be obtained, all eligible fish from the population will be sampled (i.e. steelhead stocks for the Tucannon and Touchet). Standard hatchery practices of egg disinfection and use of pathogen-free rearing water during early rearing are considered sufficient fish health measures for the control of viral pathogens, including infectious hematopoietic necrosis virus (IHNV). No culling is planned due to IHNV.

4. Broodstock and Egg Fungus Management

All adult Chinook and steelhead held for broodstock or for adult out planting will be treated with formalin every other day to control external fungus. All eggs will be treated with formalin daily to control fungus. Treatments will be started 24 hours after fertilization. Treatment of Chinook eggs will halt seven days before hatch. Steelhead egg treatments will stop when the eggs are transferred to baskets for hatching.

Rainbow trout eggs are received at the eyed stage and are not treated with formalin.

XIII. COMMUNICATION

The list of people on the following table are either directly involved in the operation of the LFC, or in related programs and facilities.

Name	Agency	Position	Phone	Email
Policy				
Chris Donley	WDFW	Reg. 1 Fish Program Mgr.	509-892-7861	christopher.donley@dfw.wa.gov
Julie Collins	USFWS	LSRCP Project Lead	208-378-5668	julie_collins@fws.gov
Mark Robertson	USFWS	LSRCP Policy Lead	208-378-5323	mark_robertson@fws.gov
Gary James	CTUIR	Fisheries Program Mgr.	541-276-4109	garyjames@ctuir.org
Dave Johnson	NPT	Fisheries Dept. Mgr.	208-621-3736	davej@nezperce.org
Pete Hassemer	IDFG	Anandromous Fish Mgr.	208-334-3791	phassemer@idfg.idaho.gov
Production				
Ace Trump	WDFW	LFC Manager	509-646-9201	Ace.Trump@dfw.wa.gov
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Chris Starr	USFWS	Hatchery Coordination	208-378-5329	chris_starr@fws.gov
Brian Zimmerman	CTUIR	Production Supervisor	541-429-7286	brianzimmerman@ctuir.org
Jon Lovrak	CTUIR	Production Leader	541-429-7278	jonlovrak@ctuir.org
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Bruce McLeod	NPT	Acclimation Facilities	208-621- 2403	brucem@nezperce.org
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Appendix A: 2017 Requests for Fall Chinook Production Fish/Eggs
(2017 Broodyear)

Priority under USvOR (SRFMP)	Who	Release site	Age	# for release	transfer	Survival to release or transfer (revised 6/22/16)	Expanded for loss prior release (1/F)	Estim # green eggs to meet priority	SRL Calcs	Total estim eggtake which will cover needs through this priority
1	WDFW	onstation	yearlings	450,000		95.1%	1.05152	473,186	95.1 mean survival, 2010-2014BY	473,186
4	NPT	CJ	yearlings	150,000	151,515	93.7%	1.06724	160,085	99.0 % survival transfer to rel BY07-11	953,442
3	NPT	BC	yearlings	150,000	151,515	93.7%	1.06724	160,085	3.3% green to eye, est 2% eye-transf	793,357
2	NPT	PIT	yearlings	150,000	151,515	93.7%	1.06724	160,085	1% transf-rel	633,271
			900,000						953,442	
5	WDFW	onstation	subs	200,000		94.5%	1.05820	211,640	94.5% egg-rel survival, BY10-BY14	1,165,082
6	NPT	CJ	subs	500,000	501,002	94.5%	1.05820	529,101	99.8% transf-release survival	1,694,183
7	NPT	BC	subs	500,000	501,002	94.5%	1.05820	529,101		2,223,284
11	NPT	CJ 2nd release	subs	200,000	200,401	94.5%	1.05820	211,640		3,085,464
8	NPT	PIT	subs	200,000	200,401	94.5%	1.05820	211,640		2,434,924
10	NPT	PIT	subs	200,000	200,401	94.5%	1.05820	211,640		2,873,824
			1,800,000						1,904,762	
12	DNFH/Irrigon	Transportation	eyed eggs	0				0	3.3% green-eye loss BY15-11	
13	WDFW/Irrigon	GRR-direct rel	eyed eggs	200,000	220,000	90.9%	1.10000	227,260	90.9% loss including Irrigon loss to release	227,260
16	WDFW/Irrigon	GRR-direct rel	eyed eggs	200,000	220,000	90.9%	1.10000	227,260	(target release/# requested)	454,520
14	DNFH/Irrigon	Transportation	eyed eggs	0				0		
9	IPC/Irrigon	HC Dam	eyed eggs	200,000	220,000	90.9%	1.10000	227,260		2,662,184
15	IPC/Irrigon	HC Dam	eyed eggs	200,000	220,000	90.9%	1.10000	227,260		227,260
17	IPC/Irrigon	HC Dam	eyed eggs	600,000	660,000	90.9%	1.10000	681,780		1,136,300
			1,400,000						1,590,820	
			4,100,000	**released**				**4,449,024**	**green eggs to meet needs through priority 17**	
		number of Snake River origin females needed to spawn						1112	(Estimated using 4000 eggs/F)	
		Female trapping goal to meet requests through priority 17:						1190	(approx 5% strays, 2% mortality, nonviable)	

Appendix B:
2017 Fall Chinook Trapping/Sampling Protocols at LGR

Protocols:

1) **These protocols presume a 24 hour/day, 7 days per week trapping at 20%.** Fish trapped during a 24 hour 7 day a week trapping period will not be operculum punched. **If the systematic sampling rate is changed, all fish hauled to hatcheries must receive an operculum punch on the right side (ROP) and if trapping changes to only 4 hours per day (100%trap rate), all fish hauled to the hatcheries must receive an operculum punch on the left side (LOP).**

2) Males and females will not be inoculated.

3) All fish > 70 cm will be hauled to LFH and NPTH. LFH will haul 70% and the NPT will haul 30%.

4) Sort by code fish follow the same haul/release protocol below unless the tag action code indicates that the fish should be radio tagged and released.

5) Wire tagged males <70 cm hauled to LFH.

6) Wire tagged females <70 will hauled to LFH and NPTH under the normal 70/30 split.

7) Unmarked/untagged females <70 will be hauled to LFH.

8) Jacks suspected of being summers will need to be subsampled for wires.

9) Only scale sample fish released from the trap. Do not scale sample hauled fish.

10) DNA sample all fish trapped regardless if hauled to hatchery or released.

Wire tagged fish:

Fork Length	Action
≥ 70cm	Haul all wires (DNA sample all)
<70 cm	Haul 1 out of 4 wires (put F in with "LARGES" for LFH and NPT and M go into tank for LFH), DNA sample all
	Release 3 out of 4 wires (DNA sample all)

Untagged fish:

Fork Length	Action
≥ 70 cm	Haul all fish (DNA sample all).
<70 cm	Haul 1 out of 4 F to LFH (DNA sample all). Release 3 out of 4 F (collect scales and DNA). Release all M (collect scales and DNA).

Appendix C:
2017 Trapping, Mating, and Sampling Protocols at LFH

LFH may start up the volunteer trap if a shortfall of females or males being collected at LGR happens.

Sorting protocol

Count and sex all fish: 1) Males and females.

Count LGR trapped females returned to the pond during the spawn day.

Sampling protocol

LFH staff processing DIPS: Document Fork length, sex, presence/absence of CWT, and PIT tag number. Take scales and a fin clip (DNA) on all untagged fish and take the snout of the fish if CWT is detected.

SRL staff processing during spawning days:

Processing table: Fin clips for DNA: take sample on every fish so data can be used for run reconstruction purposes, as well as profiling broodstock.

Scales: taken on all fish

Female broodstock total body weights
1st week of spawning: weigh first 50 females that have a CWT and the first 50 females that are unmarked/untagged (appear wild) and note fish ID number

2^{nd} week-4^{th} week: weigh first 25 females that have a CWT and 25 females that are unmarked/untagged <u>each spawn day</u>

Carcasses for nutrient enhancement: After otoliths are taken from the carcasses, a tote of fish will be filled and dumped into a bin next to the loading dock. These fish will be frozen separately and taken to the Tucannon River for nutrient enhancement after ELISA testing.

Mating protocol at LFH

Our goals are to maximize the use of potentially natural origin fish and larger/older aged fish and to exclude jills and strays from broodstock.

All wire tagged fish must wait until their CWTs are decoded before they are used in a mating.

Stray males will be culled based on CWTs. If broodstock limited, up to 56 stray females may be spawned and retained, presuming 1,112 matings are needed to make production. Any male used on a stray female must also be used on another female that will be retained for production (inbasin hatchery origin, or untagged unknown origin).

Wire tagged Males verified as adults can be used on multiple females.

Untagged Males ≥75 cm can be used on multiple females.

Untagged Males 70-74 cm will only be used in 1 x 1 crosses unless there is a shortage of males.

Males <70 cm will not be used in matings unless they are verified as adults. This size criteria may be adjusted in season.

Fecundity monitoring and Jills

All females will be spawned when ripe and the gametes will be held in incubators until we can determine if we have enough adult females to offset the culling, and to monitor fecundity. If we have enough adult females to make production goals, after eye up and fecundity estimation, jills will be culled. Jills verified by CWTs will be spawned with males of a larger fork length. Any male used on a jill must also be used on a larger or older aged fish that will be retained for production. This will be done to ensure if the jill is culled or a fry plant is made, the gametes from the male will still contribute elsewhere in production.

Appendix D: FCAP Facilities

1.1 Pittsburg Landing

The acclimation facility at Pittsburg Landing consists of: 16 -20ft aluminum circular tanks; 2 aluminum distribution boxes; 4 river intake screens; ring lock flexible hose: 4" = 1,260 ft, 6" = 1,780 ft, 8" = 3,110 ft; camlock flexible hose: 6" = 2,080 ft; 1 - 500 gallon diesel storage tank; 1 - 20ft storage container; 2 - 30ft camp trailers; 1 - 1996 Chevy S-10 pickup; two alarm systems; 16 emergency oxygen systems - hoses, micro diffusers and regulators (1 per tank); a trailer mounted 4,000 watt generator light plant; one utility storage trailer; 16 camouflage nets; 2 trailer mounted hydrocyclones; miscellaneous bolts, seals, camlock fittings, etc. Equipment used at Pittsburg Landing and the other two facilities was purchased by USCOE, Walla Walla under the FY95 Congressional Add-on (Senate Report, 103-672, p7).

Water is pumped directly from the Snake River to the acclimation tanks by four, 4-inch diesel pumps. Water pumps are rented from a contractor because leasing appeared to offer the least cost over a ten-year life cycle. Each pump has a portable water intake screen that is placed into the river each year and connected to the pump by 120 ft of 6-inch plastic hose. The pumps provide 500 gpm of water and operate 24 hours each day throughout the 6-week acclimation period except for oil checks and servicing. A 1,000 gallon tank, placed within a spill containment barrier, supplies fuel for the pumps. The water is pumped to one of two12 ft. high water distribution boxes, containing degassing towers to remove nitrogen gas, before flowing through a series of downsizing pipes to the rearing units.

The rearing units consist of 16 circular aluminum tanks, 20 ft in diameter and 4 feet deep. The tanks are transported from the storage area by a 20 ft flatbed lift-truck and placed on leveled 6-inch by 6-inch wood timbers. The tanks, made in two pieces and bolted together, drain water from the center of the tank through an 8-inch pipe placed in a plywood manhole running under the tank. The tank is fitted with vertical 12-inch circular perforated aluminum screen and the water depth controlled by a 6-inch center PVC standpipe. The rearing water enters the tank through a 4-inch pipe located on the edge of the tank and is directed in a manner to facilitate a circular motion to aid the movement of fish waste and mortality to the center screen. Water flow is controlled by a 4-inch gate valve located on the incoming line and maintains flows at l00 gpm. The water discharge line is connected from the tank to the river by an 8-inch flexible plastic pipe, which is also used to release the fish.

A 24-volt alarm system constantly monitors water levels in each rearing tank and each of the two water distribution towers. An enunciator panel that provides a visual and audio alarm when a low water level is detected monitors the alarm system. The alarm control box and enunciator panel is located near the staff-housing trailer.

Assembly of the acclimation site begins in February each year with the transport of equipment and material from an offsite storage area. In 2006, the U.S. Forest Service (USFS) agreed to a trial operation of allowing the NPT to leave half of the assembled fish rearing tanks in place and remove the other half and related equipment at a storage site near the fish acclimation site. This agreement should greatly reduce equipment fatigue and reduced assembly and disassembly time by half.

1.2 Big Canyon

The Big Canyon facility uses identical or similar equipment to that of Pittsburg Landing. The rearing tank assembly has been changed over the years to include a single row of tanks that sit flat on the gravel surface. The center drain line is located in a trench dug under the tank, thus eliminating the need for 12-inch deep gravel pad that was previously used. This method can only be used where the proper elevation is available to facilitate water discharge to the river.

The USCOE agreed to furnish electric pumps to replace the diesel units that were rented each year. Electric pumps were installed and tested before the 2002 acclimation season. The electric pumps provide the same performance as the diesel pumps while reducing rental and maintenance costs, allowing onsite staff reduction and eliminates the risk of a major fuel spill.

FCAP Project Leader received verbal agreement from the Nez Perce Tribe that allows the fish rearing tanks and water distribution tower to remain assembled at the site the entire year. This eliminates the need for an assembly and disassembly contract and reduces equipment fatigue hence provide dollar savings to the program.

1.3 Capt. John Rapids

The Capt. John Rapids Fall Chinook Acclimation Facility is a single 150=X50= in-ground, lined pond that is supplied with Snake River water by two independent 1,250 gpm submersible electric pumps. Other facility equipment and capital construction consists of: 2 river intake screens; one camp trailer; one standby propane generator; one water well (domestic water); septic system; commercial electric service; alarm system; telephone service. The pumps and intake screens were designed to be placed into the river and then removed following fish acclimation each year but were replaced in 2001 with permanent intake screens located in the main Snake River channel. The pump intake screens are provided with an air back flush system to remove debris and an alarm system is available to monitor flows.

The pumps deposited large amounts of sand in the acclimation pond, which was removed by hand tools between each group of fish. The deposited sand created extremely poor environmental conditions for the fish during release

Negotiations with the USCOE resulted in the installation of two sand separators, two larger sized water pumps, and upgrade of the electrical and pump control panels and changes in the pond water alarm system. Installation of the new equipment began in the fall of 2007 and testing indicated that the sand separators removed most of the sand load that had been deposited in previous years.

2. Operations

2.1 Fish transport

Approximately 150,000 fall Chinook salmon yearlings will be transferred from Lyons Ferry Hatchery to CJR around the 1st of February at 12.5 fish per pound. Fish acclimated at CJR are transported by WDFW one month earlier than the other acclimation facilities to make rearing space available for subyearlings at Lyons Ferry Hatchery. On or about 01 March, 150,000 yearlings will be transported to Pittsburg Landing and Big Canyon at 12 fish per pound. Transport to Pittsburg Landing and Big Canyon will be shared by WDFW and NPT.

Approximately 500,000 subyearlings will be transferred to the Big Canyon and CJR facilities and 400,000 will be transferred to Pittsburg Landing during the first week in May. CJR subyearlings will be transported by WDFW, while Pittsburg Landing and Big Canyon transports will be shared by NPT and WDFW. Lyons Ferry Hatchery personnel provide schedules and facilitate loading and enumeration of the fish. Fish transport permits will be requested from IDFG.

Beginning in 2014 with BY 2013, a second release group of approximately 200,000 subyearlings were transferred to Captain John Rapids approximately four days after the release of the first group. This second group was used as a direct stream evaluation and released near Captain John rapids prior to 2014 as priority 11 in the US v OR Management agreement table. The five year direct stream release study has ended and co-managers agreed to change the release location and acclimate this group at Captain John Rapids.

2.2 Rearing

During acclimation, staff perform daily scheduled fish culture duties that includes: checking and recording oxygen levels in the rearing units three times each day, feeding the rearing units three times each day and picking fish mortality twice each day. Staff also observes fish behavior for abnormalities and assist in fish health checks and the fish-marking program. The fish are fed Clark's fry, manufactured by Skretting of Vancouver, B.C. Fish culture methods are the same as per Integrated Hatchery Operations Team (IHOT) guidelines and consistent with WDFW fish culture techniques at Lyons Ferry Hatchery. Environmental precautions are necessary to handle diesel and oil for the portable water pumps.

Fish health services are provided by contract with the USFWS, Dworshak Fish Health Center (DFHC). The contract provides diagnostic and pathogen survey services for all fall Chinook juveniles and smolts transported to the fish acclimation facilities. The services include a fish health check before transfer, bi-weekly exams during acclimation and a pre-release exam. Other

health checks are performed as requested. Fish health protocols are as per AFS Blue Book, IHOT and Nez Perce Tribe fish health protocols.

2.3 Marking

Yearling and subyearling fish will be marked with coded wire tags (CWT), adipose fin clipped and pit tagged prior to transfer to the FCAP facilities.

2.4 Release

Yearling fish are reared and acclimated in the temporary facilities for six weeks (8 weeks at Capt. John Rapids) before release into the Snake and Clearwater Rivers in April, at a size of approximately 10 fpp, or 160-170 mm fork length. Anticipated release dates for 2017:

- Pittsburg Landing – April 09
- Captain John Rapids – April 2
- Big Canyon – April 10
-

Subyearling fish are acclimated approximately three weeks (two weeks for each group at CJR) before release in late May or early June, at 50 fpp. Release typically occurs during rising water conditions and at night to minimize predation by birds or other fish. Anticipated release dates for 2015:

- Pittsburg Landing – May 21
- Captain John Rapids first group – May 22
- Captain John Rapids second group – June 12
- Big Canyon – May 23

Emergency low water, water temperatures or facility equipment failure may necessitate an early release of fish from the facilities. The facility operator is authorized to determine when to release the fish if emergency circumstances warrant. Co-management agencies will be contacted within 24 hours with notification of an early release.

2.3 Communication

Verbal communications between FCAP personnel and co-managers is done on an as needed basis to facilitate planning, transportation and acclimation. Co-managers will be involved in any planned deviation to the fish acclimation schedule.

Fish release numbers will be reported and a FCAP fish acclimation summary will be completed by Nez Perce Tribe Research division. FCAP fish acclimation summary and other pertinent information will be presented to co-managers at the Snake River Fall Chinook Technical Group meeting.

FCAP personnel will complete and submit a project annual report to BPA in January each year.

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Appendix E: 2018 Releases - Fall Chinook Pit Tag Allocation (*USvOR* agreement)

Summary of PIT tag allocation for release year 2018 Snake River fall Chinook salmon hatchery production.

Priority	Production Program						Release numbers available for PIT tagging		Tagging Lead / Uploading
							Subyearlings		
	Rearing Facility	Number	Age	Release Location(s)	PIT Tag #'s Monitor Mode	PIT Tag #'s Bypass if Collected	Yearlings		
							Subyearling Sample Size		
						BIC	Representative Allocation		
1	Lyons Ferry	450,000	1+	On station	30,000	0			WDFW/WDFW(monitor mode for SARs)
2	Lyons Ferry	150,000	1+	Pittsburg Landing		1,000			NPT/NPT
3	Lyons Ferry	170,000	1+	Big Canyon		1,000			NPT/NPT
4	Lyons Ferry	155,000	1+	Captain John Rapids		1,000			NPT/NPT
5	Lyons Ferry	200,000	0+	On station	20,000	0			WDFW/WDFW(monitor mode for SARs)
6	Lyons Ferry	500,000	0+	Captain John Rapids		26,000			NPT/NPT
7	Lyons Ferry	500,000	0+	Big Canyon		2,000			NPT/NPT
8	Lyons Ferry	200,000	0+	Pittsburg Landing		26,000			NPT/NPT
9	Irrigon	200,000	0+	Hells Canyon Dam		1,500			IPC/IPC
10	Lyons Ferry	200,000	0+	Pittsburg Landing					NPT/NPT
11	Lyons Ferry	200,000	0+	Captain John Rapids 2		2,000			NPT/NPT
13	Irrigon	200,000	0+	Grande Ronde River		1,500			WDFW/WDFW
15	Irrigon	200,000	0+	Hells Canyon Dam		1,500			IPC/IPC
16	Irrigon	195,000	0+	Grande Ronde River		1,500			WDFW/WDFW
17	Irrigon	250,000	0+	Hells Canyon Dam					IPC/IPC
NPTH 1	NPTH	500,000	0+	NPTH		2,000			NPT/NPT
NPTH 2	NPTH	200,000	0+	Lukes Gulch		2,000			NPT/NPT
NPTH 2	NPTH	200,000	0+	Ceder Flats		2,000			NPT/NPT
NPTH 3	Irrigon	500,000	0+	North Lapwai Valley		2,000			NPT/NPT
TOTAL	**Yearlings**	**900,000**					**0**	PIT Yearlings	PIT Subyearlings
	Subyearlings	**4,245,000**						**0**	**0**

Total PIT tags:

LSRCP tags
BPA tags
IPC tags 3,000

Appendix F - Adult Disposition Model for Tucannon spring Chinook (to be reconsidered and revised by 2017)

HOR = Hatchery origin return — **modified based on Tribal comments on Jan 18, 2013** -corrected formulas for 65% of run at trap

NOR = Natural origin return — MAT = 750, so 555 NOR at trap provides ~750 NOR to river

Predicted HOR =	203	at trap	Total predict. HOR=	312						**Dispostion Table**						PNI Prior to harvest or transfer	
Predicted NOR =	51	at trap	Total predict. NOR=	78		**NOR Brood**	**NOR SpEsc**	**HOR Brood**	**HOR SpEsc**	**Program Size**	**Tribal & Nontribal Harvest**	**Transfer**	**PNI**		pNOB=	0.32
Tot. Est Return at Trap =	254	at trap													pNOS=	0.12
Total River Return =	391	w/ 35% below trap		391		**50**	**23**	**106**	**175**	**225,000**	**0**	**0**	**0.27**		pHOS=	0.88
Brood Target =	156							w/o harvest or transfer mgmt								

Enter predicted Adult run size at the TFH trap in cells C5 and C6

Predicted NOR at Trap	NOR Broodst.	HOR Broodst.	PNOB (NOR Brood %)	At trap NOR SpEsc	At trap HOR SpEsc	At Trap Total Esc	At trap NOR Esc%	NOR total river escapem.	HOR total river escapem.	Total River Escapem NOR +HOR	Total Run Size in Tuc. R.	Total Escap after 15% prespawn loss	Total NOS Escapement after 15% presp loss	pNOS (NOS escapement %)	Total HOS Escapement after 15% presp loss	pHOS (HOS escapement %)
50	50	106	32%	0	97	97	0.0%	27	206	233	389	198	23	11.5%	175	88.5%
100	50	106	32%	50	97	147	34.0%	104	206	310	466	264	88	33.5%	175	66.5%
150	75	81	48%	75	122	197	38.1%	156	231	387	543	329	132	40.2%	197	59.8%
200	85	71	54%	115	132	247	46.6%	223	241	464	620	394	189	48.0%	205	52.0%
250	85	71	54%	165	132	297	55.6%	300	241	541	697	460	255	55.4%	205	44.6%
300	100	56	64%	200	147	347	57.6%	362	256	618	774	525	307	58.5%	218	41.5%
350	110	46	71%	240	157	397	60.5%	428	266	695	851	591	364	61.7%	226	38.3%
400	125	31	80%	275	172	447	61.5%	490	281	772	928	656	417	63.5%	239	36.5%
450	140	16	90%	310	187	497	62.4%	552	296	849	1005	721	469	65.1%	252	34.9%
500	156	0	100%	344	203	547	62.9%	613	312	926	1082	787	521	66.3%	265	33.7%
550	156	0	100%	394	203	597	66.0%	690	312	1002	1158	852	587	68.8%	265	31.2%
600	156	0	100%	444	203	647	68.6%	767	312	1079	1235	917	652	71.1%	265	28.9%
650	156	0	100%	494	203	697	70.9%	844	312	1156	1312	983	717	73.0%	265	27.0%
700	156	0	100%	544	203	747	72.8%	921	312	1233	1389	1048	783	74.7%	265	25.3%
750	156	0	100%	594	203	797	74.5%	998	312	1310	1466	1114	848	76.2%	265	23.8%
800	156	0	100%	644	203	847	76.0%	1075	312	1387	1543	1179	914	77.5%	265	22.5%
850	156	0	100%	694	203	897	77.4%	1152	312	1464	1620	1244	979	78.7%	265	21.3%
900	156	0	100%	744	203	947	78.6%	1229	312	1541	1697	1310	1044	79.7%	265	20.3%
950	156	0	100%	794	203	997	79.6%	1306	312	1618	1774	1375	1110	80.7%	265	19.3%
1000	156	0	100%	844	203	1047	80.6%	1382	312	1695	1851	1441	1175	81.6%	265	18.4%
1100	156	0	100%	944	203	1147	82.3%	1536	312	1849	2005	1571	1306	83.1%	265	16.9%
1200	156	0	100%	1044	203	1247	83.7%	1690	312	2002	2158	1702	1437	84.4%	265	15.6%
1300	156	0	100%	1144	203	1347	84.9%	1844	312	2156	2312	1833	1567	85.5%	265	14.5%
1400	156	0	100%	1244	203	1447	86.0%	1998	312	2310	2466	1964	1698	86.5%	265	13.5%
1500	156	0	100%	1344	203	1547	86.9%	2152	312	2464	2620	2094	1829	87.3%	265	12.7%

Model Calculations and Assumptions
Cell C5 - Predicted HOR at Tucannon FH trap: This is an entered number based on preseason projection
Cell C6 - Predicted NOR at Tucannon FH trap: This is an entered number based on preseason projection
Cell C7 - Total Estimated Run at the trap: Sum of HOR and NOR preseason projections
Cell C8 - Total run at trap divided by 0.65 to estimate total return to Tucannon River, including downstream of trap (35%).
Cell C9 - Brood Number: This is a constant number of 170 based on a 225,000 production level at HOR levels >500 - would be adjusted downward at lower HOR levels
Column A - Predicted NOR at the trap: Lookup value column based on cell C6 preseason projection at trap.
Column B - NOR Broodstock Requirement: generally 50% of brood need up to 350 NOR predicted return to trap, except at NOR < 100
Column C - HOR Brood Requirement: Total brood need - NOR brood
Column D - NOR Brood Percent: % NOR in broodstock
Column E - NOR at trap minus NOR broodstock taken
Column F - HOR Spawning Escapement above the trap after broodstock taken
Column G - Total NOR and HOR Spawning Escapement above the trap: after broodstock
Column H - % NOR Escapement Percent above trap
Column I - NOR total spawning escapement (trap passage plus 35% below the trap)
Column J - HOR total spawning escapement (trap passage plus 35% below trap)
Column K - Sum of NOR and HOR total spawning escapement (trap passage plus 35% below trap)
Column L - Total return to the Tucannon River, including all broodstock taken
Column M - Total escapement in the Tucannon River after broodstock collection, minus 15% prespawn mortality
Column N - NOR escapement after broodstock collection and 15% prespawning loss in river
Column O - HOR escapement after broodstock collection and 15% prespawning loss in river

Appendix G: Tucannon River Summer Steelhead Broodstock and Weir Management Sliding Scale.

Estimated NOR Return to Weir (based on PIT Tag Estimates)		Total NOR & HOR needed for Broodstock	Total Broodstock Needed for Conservation Program	Conservation Brood		Total Broodstock Needed for Mitigation Program	Mitigation Brood		# of NOR's Used for Total Broodstock needs	# of HOR's Used for Total Broodstock needs	NOR's Released Above Weir	
				NOR	HOR		NOR	HOR			Min	Max
	<50	78	26	16	10	52	0	52	16	62	10	34
50	200	78	26	18	8	52	0	52	18	60	37	187
201	400	78	26	21	5	52	0	52	21	57	185	384
401	600	78	26	26	0	52	5	47	31	47	378	577
601	800	78	26	26	0	52	10	42	36	42	574	773
801	1000	78	26	26	0	52	15	37	41	37	770	969

Table Continued…..

Estimated NOR Return to Weir (based on PIT Tag Estimates)		Actual HOR Returns		Total Fish Released Above Weir		%NOR Used in Broodstock from Total Return to Weir		% NOR in Conservation Program	% NOR in Total Program	pHOS (effective) above the Weir		PNI above the Weir	
		Low	High	Min	Max	Min	Max	PNOB	PNOB	High	Low	Low	High
	<50	68	313	78	347	NA	32%	62%	21%	0.96	0.58	0.39	0.51
50	200	70	315	107	502	36%	9%	69%	23%	0.86	0.21	0.45	0.77
201	400	73	318	258	702	10%	5%	81%	27%	0.55	0.12	0.6	0.87
401	600	83	328	461	905	8%	5%	100%	40%	0.38	0.09	0.73	0.92
601	800	88	333	662	1106	6%	5%	100%	46%	0.29	0.07	0.78	0.93
801	1000	93	338	863	1307	5%	4%	100%	53%	0.23	0.06	0.81	0.94

1) F1 hatchery origin fish - from the conservation program - will be used for broodstock needs in both conservation and harvest programs.

2) No AD-clipped fish will be used for broodstock, though some will be passed upstream to meet the maximum hatchery fish upstream of the weir (375-broodstock needs)

3) Goal is to have about 300-350 total hatchery origin fish (of either group - conservation preferred over mitigation) above the weir - to ensure future broodstock needs

Appendix H. Numbers of PIT Tags and Coded-Wire Tags implanted into spring Chinook, fall Chinook, or summer steelhead at Lyons Ferry Hatchery Complex, and funding source of those tags.

Species	Stock	Age	Release Location	Program Release Goal	PIT Tag (LSRCP)	PIT Tags (BPA)	PIT Tags (Other)	CWT (LSRCP)	CWT (BPA)	PBT Baseline Evaluation
SPCHK	Tucannon	1+	Tucannon River	225,000	7,500	7,500		225,000		BPA
FACHK	Snake River	1+	Snake River, Lyons Ferry FH	450,000	30,000			450,000		BPA
FACHK	Snake River	1+	Snake River, Pittsburgh Landing	150,000		1,000		150,000		BPA
FACHK	Snake River	1+	Snake River, Captain Johns Landing	150,000		1,000		150,000		BPA
FACHK	Snake River	1+	Clearwater River, Big Canyon	150,000		1,000		150,000		BPA
FACHK	Snake River	0	Snake River, Lyons Ferry FH	200,000	20,000			200,000		BPA
FACHK	Snake River	0	Snake River, Pittsburgh Landing	200,000		13,000		200,000		BPA
FACHK	Snake River	0	Snake River, Pittsburgh Landing	200,000		13,000		200,000		BPA
FACHK	Snake River	0	Snake River, Captain Johns Landing	500,000		26,000		200,000		BPA
FACHK	Snake River	0	Snake River, Captain Johns Landing	201,000		2,000		200,000		BPA
FACHK	Snake River	0	Clearwater River, Big Canyon	500,000		2,000		200,000		BPA
STL	Wallowa	1+	Touchet R. @ Dayton Acclimation	100,000	3,000			20,000		BPA
STL	Wallowa	1+	Snake River @ Lyons Ferry Hatchery	60,000	5,000			20,000		BPA
STL	Wallowa	1+	Grande Ronde R. @ Cottonwood Pond	225,000	4,000		2,000	20,000		BPA
STL	Wallowa	1+	Grande Ronde R. @ Wallowa Hatchery	NA	4,000			NA		BPA
STL	Touchet Endemic	1+	Touchet R., Dayton Acclimation	50,000	5,000	5,000		50,000		BPA
STL	Tucannon-Mitigation	1+	Tucannon River (lower)	100,000		7,500			25,000	BPA
STL	Tucannon-Conservation	1+	Tucannon River, Curl Lake	50,000		7,500			50,000	BPA
SPCHK	Tucannon	1+	Tucannon River at Smolt Trap	NA	5,000			NA		NA
STL	Tucannon	1+	Tucannon River at Smolt Trap	NA		2,500		NA		NA