LYONS FERRY COMPLEX
ANNUAL OPERATIONS PLAN

For the Period of

OCTOBER 1, 2015 – SEPTEMBER 30, 2016

Prepared by:

Washington Department of Fish and Wildlife

Washington Department of FISH AND WILDLIFE

Nez Perce Tribe

Confederated Tribes of the Umatilla Indian Reservation

IDAHO POWER. An IDACORP Company

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LOWER SNAKE RIVER COMPENSATION PLAN Hatchery Program

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 Pond (Curl Lake AP).

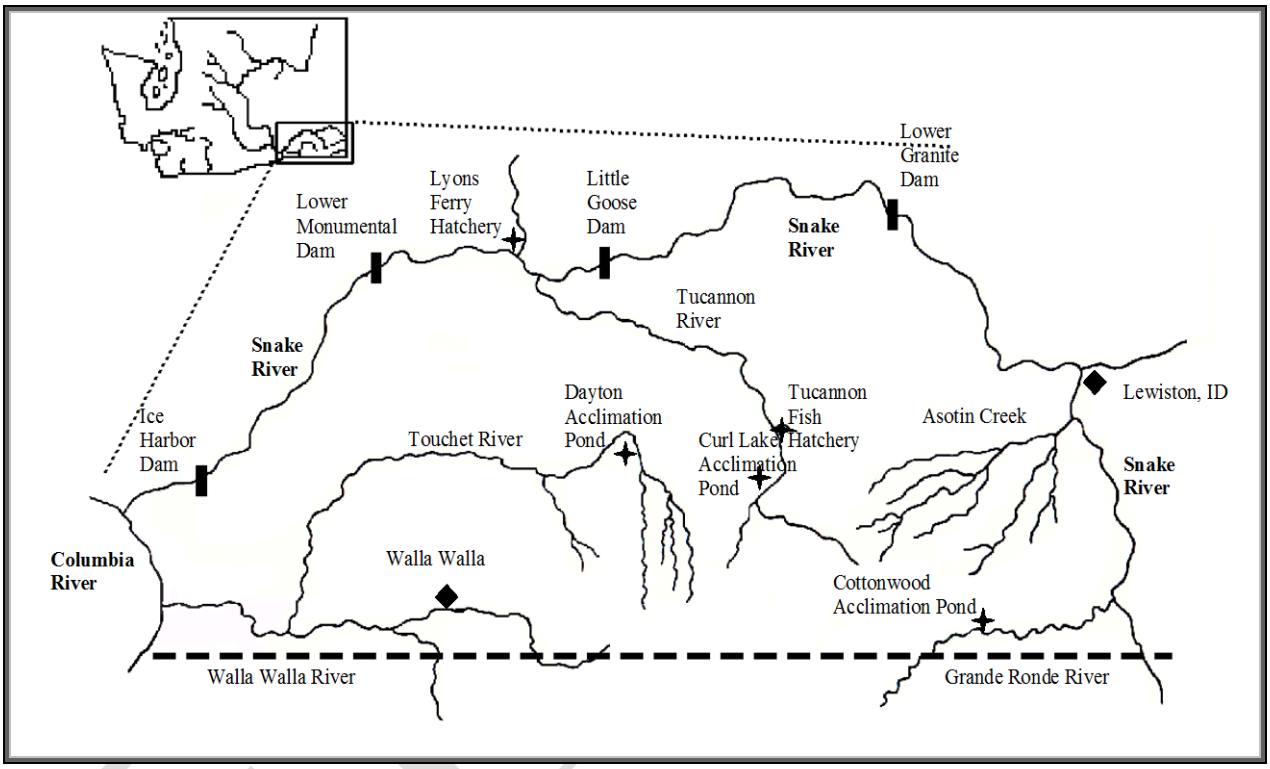

Figure 1. Map of the Lower Snake River Compensation Plan (LSRCP) LFC Facilities, and major rivers and streams in Southeast Washington.

LSRCP funded fish production in Washington began in 1983, with the construction of trout and steelhead rearing facilities at the 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. Initially it was operated as two separate facilities. Washington Department of Wildlife (WDW) operated the north hatchery, producing steelhead and rainbow trout. Washington Department of Fisheries (WDF) operated the south 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.

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 rearing lakes also covered in 2" netting holding ~ 643,500 cubic feet (ft^3) of water each, (1,100 ft x 90 ft x 6.5 ft dimensions). 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 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 building. A project to install six 26' round tanks and 5 12' intermediate tanks in the former spring Chinook captive broodstock area is anticipated to be completed in the future. These tanks will provide additional rearing space to accommodate increased production of steelhead and/or spring Chinook. This project is currently awaiting approval from LSRCP and cost share with BPA.

Water is supplied to LFH from the Marmes pump station, which has emergency power backup generation was completely upgraded from 2013 to 2015. 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^o F.

The underground medium-voltage loop at the hatchery was completely replaced in early spring 2013.

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. Fish production began in 1949 by the Washington Department of Game. 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 the hatchery. 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, resulting in temporary loss of water flows. An estimated 8 hours of water supply is currently available, however, a proposed dredging project in 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 this source 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 15ft x .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. The pond is approximately 170 ft. x 200 ft. x 6.5 ft. in size. 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. 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. There is an adult trapping 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 just upstream of the pond. 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 Wallowa stock summer steelhead into the Touchet River, and we will begin acclimation/release of Touchet endemic stock steelhead in 2016 as part of the study being conducted (see Touchet Steelhead Section). 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 Pond

Curl Lake AP is located along the Tucannon River at RM 41 in Columbia County, Washington. The construction of Curl Lake AP was completed in February 1985. Curl Lake AP is an earthen pond holding ~ 784,000 ft^3 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 spring Chinook yearlings for release into the Tucannon River and beginning in 2016, we will release steelhead from the lake. 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 and steelhead are released in mid-April or early May, respectively, 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 the pre-smolts, LSCRP provided the funding for an electrified cyclone fence which was installed in early 2015. WDFW staff maintains and monitors 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.

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, 400,000, and Captain John's Rapids, 500,000, on the Snake River between Asotin and Hells Canyon Dam and Big Canyon, 500,000 and an additional 200,000 on a second plant from the Captain John's Rapids site.

B. Fish Production Summary

Annual hatchery production is intended to meet LSRCP adult return goals for several species. Current production levels are set to either 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 LFH have been approved through the *U.S. v Oregon* (*US v OR*) 2008-2017 Management Agreement. LFH is planning BY2015 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). LFH is currently utilizing two hatchery steelhead stocks (Wallowa and Tucannon) to fulfill harvest mitigation objectives under LSRCP, and also rears two natural-origin hatchery endemic broodstocks, (Touchet and Tucannon Stocks), for conservation purposes in the Touchet and Tucannon rivers. The numbers of fish released in 2014 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. A project to expand rearing capacity at LFH has been developed and may be implemented in the 2015-16 cycle. Remodeling is focused on the former spring Chinook captive brood area to establish new intermediate and full term rearing tanks. The emphasis on this area will be increased rearing area for the Tucannon endemic steelhead program with new and larger rearing tanks. Current recommendations are to increase the combined conservation/harvest mitigation release numbers from 100,000 to 150,000 for this program once the additional rearing space is provided, and the adult management plan and broodstock sliding scale has been approved.

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 2015-16 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**	3,100,000 230,000 670,000 122,100 **4,122,100**	119,167 8,000 131,388 47,893 **306,448**
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**	253,000[c] 97,298 75,000 **425,298**	14,056 37,377 16,667 **68,100**
Cottonwood AF	Grande Ronde (28.7)	Cottonwood Creek	Steelhead	**250,000**	**31,250**	**200,000**	**44,444**
Curl Lake AP	Tucannon (41)	Tucannon R.	Steelhead Spring Chinook	**160,000** -0-	**32,000** -0-	-0- **225,000**	-0- **18,750**
Dayton AF	Touchet (53)	Touchet R.	Steelhead	**125,000**	**27,750**	**85,000**	**18,889**

[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 factor 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]Spring Chinook rearing capacity is during the fall/winter months when rainbow trout are reared in the earthen rearing pond on river water. Earthen pond not in use during the summer months due to high water temperatures. The spring Chinook and rainbow program cannot be reared concurrently to full term at TFH due to early rearing limitations.

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

Species	Year slated for release/transfer				
	2015 Goal	2015 Actual Plants and Transfers	2016 Goal [a]	Fish/Eggs on Hand For 2016 Goal	2017 Tentative Plan [a]
Fall Chinook					
Yearling releases:	**BY 2013**	**BY 2013**	**BY 2014**	**BY 2014**	**BY 2015**
LFH-on station	450,000	452,372	450,000	487,000	450,000
NPT – FCAP (transfer)	465,000	465,283	455,000	473,500	455,000
Subyearling releases:	**BY 2014**	**BY 2014**	**BY 2015**	**BY 2015**	**BY 2016**
LFH-on station	200,000	219,699	200,000	0	200,000
NPT – FCAP	1,403,000	1,486,897	1,403,000	0	1,403,000
NPT – Capt. John 2	201,000	218,692	201,000	0	201,000
Eyed Egg Transfers:	**BY 2014**	**BY 2014**	**BY 2015**	**BY 2015**	**BY 2016**
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 2013	**BY 2013**	**BY 2014**	**BY 2014**	**BY 2015**
Yearling smolt production	197,000	174,013	225,000	221,000	225,000
Smolt rearing study @ TFH	28,000	21,695	0	0	0
Summer Steelhead (Stock)					
	BY2014	**BY 2014**	**BY2015**	**BY 2015**	**BY 2016**
On Station (Wallowa)	110,000	75,456	110,000	101,000	110,000[c]
Touchet (Wallowa)	85,000	87,451	85,000	85,000	85,000
Walla-Walla (Wallowa)	100,000	110,751	100,000	100,000	100,000
Cottonwood (Wallowa)	160,000	206,735	200,000	200,000	200,000
ODFW Wallowa Hat	40,000		40,000		40,000
Tucannon (Endemic)	100,000	106,871	100,000	95,347	100,000[c]
Touchet (Endemic)	50,000	48,711	50,000	48,040	50,000
Spokane Rainbow Trout					
Mitigation	**BY 2013**	**BY 2013**	**BY 2014**	**BY 2014**	**BY 2015**
Catchables	197,500	225,116	197,500	217,118	197,500
Jumbo's	1,000	5,218	1,000	6,347	1,000
IDFG Catchables	17,600	16,520	17,600	18,600	17,600
Jumbo's – NPT's	1,650	1,650	1,650	1,700	1,650
State Program					
Jumbo's – TSS organization	4,000	4,178	4,000	5,254	4,000

[a] Based on the *US v. Oregon* table B4b.;

[b] Transfer numbers include an 10% overage to assure IPC meets mitigation goals if coagulated yolk problems persist at Irrigon.

[c] Dependent on agreed upon adult mgmt. plan and broodstock collection plan and round tanks installed at LFH for rearing. Per the US v OR agreement: The on-station release at Lyons Ferry will vary from 60,000-135,000 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).

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 BY2015 fall Chinook production based on table *B4B*, (Table 3).

The LFH was initially designed to release 9.16 million fall Chinook subyearlings (Table 1) at around 90 fpp. Currently this facility 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 million 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 10fpp 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 programs is 50fpp. 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 some 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 2014

At the end of August 2015, LFH had 962,137 juvenile Snake River fall Chinook on hand. The program goal is to transfer 455,000 yearlings to FCAP facilities in February and March of 2016, and 450,000 yearlings will be released on-station at LFH in early spring 2016, (Table 4). Approximately 30,000 of the on-station yearlings were PIT tagged in August 2015. 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 will also be used to select fish at LGR to radio tag as part of a fidelity and fallback study.

Table 4. BY14 Snake River fall Chinook tagging, transfers and proposed releases.

Site	Expected Transfer	Expected Release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
LFH	N/A	487,000	10	1+	246,884 AD/ CWT 240,312 CWT Only	15,000 15,000	April 2016
Capt. John Rapids	164,500	164,000	13	1+	72,579 AD/CWT 93,356 CWT Only	1,000*	Feb – 2016 (transfer)
Pittsburg Landing	154,500	154,000	12	1+	72,746 AD/CWT 82,645 CWT Only	1,000*	Mar – 2016 (transfer)
Big Canyon	154,500	154,000	12	1+	72,604 AD/CWT 82,553 CWT Only	1,000*	Mar - 2016 (transfer)

*Note: tags and tagging to be provided by NPT

B. Trapping

Brood Year 2015

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 a goal of 30% natural origin fish in the broodstock. Trapping protocols at LGR and broodstock management will be targeted at achieving this goal.

The trapping goal (**Appendix B**) for broodstock is up to 2,600 (which includes approximately 1,300 females including Jills and strays if needed to be culled) adults based upon previously observed stray rates and pre-spawning mortalities and we anticipate that the majority of the females needed for brood will be trapped at LGR. This goal is the total numbers of fish that will need to be trapped to meet egg take goals through *Priority 15*. Collection occurs primarily at LGR, but may also occur at LFH or NPTH to meet broodstock goals. 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. This will be a result of not enough females trapped at LGR, high water temperatures that delay trapping or do not allow for adults to be trapped at LGR.

2. Lower Granite Dam

Trapping at LGR began on August 18 but water temperatures only allowed for a couple of trapping days that week. (**Appendix B**). The co-managers have set the trap rate of 12% at LGR with the intent to stay at that level throughout the season. Collection protocols were changed in September due to a stronger run than originally forecasted. 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. Additional fish needed for run reconstruction needs will be hauled to LFH. Jacks hauled for this purpose will be donated to local food banks early in the season. This hauling schedule is adjusted accordingly for meeting the established ratio. The goal will focus on females in calculating the 70:30 split.

C. Spawning

Brood Year 2015

Spawning will occur weekly, generally on Tuesdays and Wednesdays, starting on the 27th 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 BY15 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, which equates to approximately 58 of the estimated females needed for broodstock. In addition, any unmarked / untagged or known Lyons Ferry males used on a stray must will 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. This limit may be adjusted if necessary to meet production goals and if approved by the co-managers.

Jills, (one salt fish), will not be used in production unless it has been determined that we are broodstock limited. Jills will be returned to the pond during the first three weeks of spawning regardless of maturity. 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, or 2) released as unfed fry as they would be tagged by PBT. 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.

Our mating protocol will minimize hatchery stray incorporation into LFH broodstock while incorporating potentially as many wild fall Chinook as possible, up to the 30% PNOB goal. Matings will generally occur in a 1 female x 1 male cross, but larger, older aged males that are not strays, may be used multiple times on different females, but not to exceed one male per six females. If a male is used multiple times it must be used on at least one older aged female. Because the spawning population is usually large (>1,000), decreasing genetic diversity is not presently a concern. A mating matrix is provided in Appendix D.

Parental Based Tagging (PBT) tissue samples will be collected on all broodstock during spawning. Fin clips from broodstock will be archived for later analysis and profiling. 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 sampled if needed for run reconstruction and any remaining non CWT fish will be released back into the Snake River according to Table 5. Table 5 lists the areas that have been identified for each broodstock facility as suitable for disposition of surplus adults or fry. In the event of broodstock releases the fish will be marked with a caudal 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 2015

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 about 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. Chronic Bacterial Gill Disease (BGD) can occur at LFH if densities are exceeded or through additional handling, which induces stress. 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 at or smaller than 100 fpp is monitored not to exceed 0.09. Density index values can increase on a sliding scale to a maximum value of 0.14 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 2015

This section outlines the anticipated subyearling and yearling production for BY15 assuming full production of Table 3. All tagging, transfers and releases are listed in Table 6.

Egg Transfers

Assuming full production of Table 3, 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 & 14, Table 3).

The IPC subyearling program at Irrigon Hatchery will receive eggs from LFH in December and be released below Hells Canyon Dam. 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. See Table 6.

Subyearlings

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. Pittsburg Landing AF will receive 401,000 subyearlings in May. This group is comprised of 100,000 CWT, 100,000 AD+CWT, and 200,000 unmarked and untagged fish. These fish 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.

After the first CJR release in May, 201,000 subyearlings, 100% AD+CWT with 2,000 PIT tags, will be transferred to CJR, acclimated and released in June at 50 fpp. This group was previously designated for direct stream release into the Snake River near Couse Creek in the US vs Oregon agreement, Table 3. This decision was made by the co-managers after data showed a slight survival advantage of acclimated fish over direct stream released fish at CJR.

Yearlings

A yearling release of 450,000 fish from LFH directly into the Snake River at 10 fpp is programmed for 2017. All of these fish will be marked and/or tagged during July-August 2016 (225,000 AD+CWT, and 225,000 CWT only), and transferred into Lake Two. A portion of these

fish will also be PIT tagged (as many as 30,000) 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, to estimate SARs, and some will be radio tagged at LGR when they return as part of a fidelity and fallback study. In 2017, these fish will be released over an anticipated 4-day period into the Snake River the first week in April, depending on river flows and dam spills. 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 2016 (AD+CWT; CWT only) then transferred to Captain John, Big Canyon, and Pittsburg Landing acclimation sites (at ~ 12 fpp) for final rearing and release by NPT in April 2017 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 is to be determined by the funding entities. See Table 6 for proposed disposition of the BY-2015 yearlings.

Table 6. Proposed BY15 Snake River fall Chinook tagging, transfers and releases.

Site	Transfer Goal	Release Goal	Size (fpp)	Age	Mark/CWT/ Elastomer	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 2015 (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 2015 (egg transfer)
LFH	N/A	200,000	50	0+	100% AD/CWT	20,000	May – Jun 2016
Capt. John	501,000	100,000 100,000 300,000	75 75 75	0+ 0+ 0+	CWT Only AD/CWT Unmarked	26,000	May – 2016 (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 - 2016 (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 – 2016 (transfer)
Capt. John 2	201,000	200,000	50	0+	100% AD/CWT	2,000	May/June 2016
LFH	N/A	450,000	10	1+	225,000 AD/CWT 225,000 CWT Only	15,000 15,000	April 2017
Capt. John	152,000	150,000	13	1+	70,000 AD/CWT 80,000 CWT Only	1,000	Feb - 2017 (transfer)
Pittsburg Landing	152,000	150,000	12	1+	70,000 AD/CWT 80,000 CWT Only	1,000	Mar - 2017 (transfer)
Big Canyon	152,000	150,000	12	1+	70,000 AD/CWT 80,000 CWT Only	1,000	Mar - 2017 (transfer)

*Note: As of 2015, the Couse Creek release near Capt. John has been changed to a late acclimation and release from Capt. John.

F. Research

Refer to M&E SOW for LGR fidelity and fall back radio tagging study.

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 2014

At the end of August 2015, LFH had 221,663 juvenile spring Chinook on hand that have been CWT'd.

B. Tagging, Transfers, and Releases

Brood Year 2014

In June 2015, the BY14 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 release, (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 AP in March. Prior to fish being moved to Curl Lake for final acclimation, Biomark Inc. will PIT tag 15,000 fish. Smolt survival while in Curl Lake is estimated by PIT tags detected going out of the lake by means of a PIT tag array that was installed a couple of years ago on the outlet pipe.

Table 7. Proposed BY14 Tucannon River spring Chinook tagging, transfers and releases.

Site (Type)	BY14 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Release Date
Curl Lake AP	225,000	220,000	12	1+	100% CWT	15,000	Mar – Apr 2016

C. Spawning

Brood Year 2015

The egg take goal for BY15 was approximately 260,000 green eggs. It had been established that up to 85 females and 85 males are needed to meet the egg take goal. Staff at LFH spawned 75 females for an estimated 262,500 green eggs. An additional three females were killed for spawning but were not used due to the fish being Umatilla spring Chinook as determined by the CWT's. An additional 252 fish were collected at the Tucannon weir during the season to be returned back to the Tucannon River on August 17 and 24 to spawn naturally. 10 females from this group were moved into the hatchery broodstock prior to being transferred back to the Tucannon River to make up for a shortage of females in the broodstock collected. An additional 10 fish were pre-spawn mortality. The breakout of out planted fish is as follows: 110 males, 110 females and 12 jacks. This decision was made with the co-managers due to drought conditions in 2015 and the recent history of high pre-spawn mortality of Tucannon River spring Chinook salmon. A 2 x 2 spawning matrix protocol was followed. During the spawning activity, eggs and milt were collected in individual bags and placed in a cooler until fertilization, which occurred in the incubation building. Fertilized eggs were water hardened in 100ppm iodophor for one hour. All pre-spawn mortalities and spawned spring Chinook carcasses are disposed of on site.

D. Rearing

Brood Year 2015

The production goal for BY15 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 southside.

At this time WDFW is estimating a 10% prerelease mortality from Curl Lake. This number is being derived from PIT tag detections leaving the lake at release and from PIT tag arrays down the system. Due to this mortality rate, WDFW will be putting an additional 10% of production goals into the lake to release the program goal of 225,000 smolts.

Table 8. Proposed BY15 Tucannon River spring Chinook tagging, transfers and releases.

Site (Type)	BY15 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
Curl Lake AP	247,500	225,000	12	1+	100% CWT	15,000	Mar – Apr 2017

E. *Trapping*

Brood Year 2016

Trapping for the spring Chinook broodstock program is conducted exclusively at the TFH adult trap, located just upstream of the hatchery and adjacent 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 (Table 9). 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.

WDFW may also retain all of the adult, ESA-listed, Snake River spring/summer Chinook salmon that return to the Tucannon River Fish Hatchery adult trap each year if the total annual adult returns to the trap is less than 105 fish. If the total annual adult returns to the trap are 105 fish or more, WDFW is authorized to retain up to 70 percent of the adult, ESA-listed, Snake River spring/summer Chinook salmon that return to the trap each year and must release at least 30 percent of the adult, ESA-listed, Snake River spring/summer Chinook salmon that return to the trap above the hatchery weir for natural spawning. Adults collected for spawning are transferred by truck to LFH for holding. All adults are injected in the dorsal sinus at transfer with oxytetracycline and tulathromycin. Females only are re-injected with tulathromycin 30 days prior to the start of spawning. Adults will receive 167 ppm formalin treatments every-other day to control fungus and decrease pre-spawning mortality.

It is the intent of WDFW staff to collect approximately 50% of the returning adults that would normally be passed upstream to spawn naturally and bring them back to LFH to be held and released back into the river just prior to spawning in August 2016. The percentage collected will be dependent upon run forecasts and actual numbers back to the river. Conversations will be ongoing up to and through adult collection.

Table 9. Proposed BY16 Tucannon River spring Chinook tagging, transfers and releases.

Site (Type)	BY16 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
Curl Lake AP	247,500	225,000	12	1+	100% CWT	15,000	Mar – Apr 2018

Due to the fact that the final results of the Tucannon River spring Chinook salmon size at release study are just coming in and the analyses of the data and writing of the final report will not be completed until this upcoming winter/spring – WDFW feels that it would not be prudent to increase the release size of hatchery smolts to 9 or 10 fish per pound (fpp) at this time. We want this decision to be made based on the best available science and there are currently questions/concerns about the heritability of jacking in the natural population (Ford and Williamson 2009, Williamson et al. 2010, Ford et al. 2012).

WDFW is going to continue releasing smolts at 12 fpp to increase both hatchery fish survival and adult escapement. We are also going to cull hatchery jacks at the trap and pass them to mimic the NOR jacks returning to the best of our ability. Jacks culled at the adult trap will be utilized for food bank or stream enrichment purposes.

F. Research

The final returns of the size at release study will occur during 2015. A final report on the results of this experiment will be sent out in 2016.

The 2013 BY was the final brood year used in the experimental rearing study (TFH vs. LFH). There has been no significant difference in smolt outmigration survival between the two groups. The final adult returns from this study will occur in 2018.

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. These fish will be compared to fish passed upstream at the trap using operculum punches as the distinguishing mark. Spawning success/failure from out planted fish will be summarized in 2015/2016. Preliminary spawning ground survey data is showing a 65% success rate with the out planted females and a 20% success rate with the females that were passed at the trap at the time of collection.

IV. 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 Oregon and Idaho), and then released in the Wallowa River in the Grande Ronde Basin. With the elimination of the Lyons Ferry stock steelhead in December 2013, the Wallowa stock steelhead are now released in the Grand Ronde river, Walla Walla 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. It was recommended by NMFS to convert to endemic stock populations where possible. The Touchet and Tucannon endemic broodstock program began with the 2000 BY, with the original goal of collecting 16 pairs for spawning. Adjustments have been made to the broodstock collections because fecundity and survival values were higher than originally estimated.

The original evaluation plan was to utilize adult traps on the Tucannon and Touchet rivers to evaluate the returns and determine success of each endemic stock program (smolt-to-adult survival rates of the endemic program compared to Lyons Ferry stock releases). However, adult traps were only partially successful in trapping fish due to high stream flow events. As such, we are now using PIT tags to evaluate each program (smolt-to-adult returns). PIT tags have been incorporated into each endemic stock group since 2004. Returns to date from PIT tags indicate that smolt-to-adult survival (SAS) to Bonneville Dam, and smolt-to-adult return (SAR) to Ice Harbor Dam for the Tucannon Endemic stock is 1.8% and 1.4%, respectively for the 2004-2010 release years. In contrast, SAS and SAR to Bonneville or McNary for the Touchet Endemic stock is 0.64% and 0.51%, respectively. Because the Tucannon endemic program was meeting its survival goal, and there were ongoing concerns about the depressed status of the Tucannon River steelhead population, the program was increased to 75,000 smolts for BY10, and increased to 100,000 smolts for BY 2013, with 50% of the production to be directed at the harvest mitigation portion of the program.

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, Walla Walla, 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.

Actions that WDFW is proposing in the immediate future are:

1) Addition of circular ponds for expansion of the Tucannon River endemic stock program – These are required for the full expansion of the program to the agreed to 150k level.

2) In going with one hatchery stock for releases in the Walla Walla River Basin, Lyons Ferry and Cottonwood, this action will free up a rearing lake at LFH; which will allow for the possibility of bringing in another stock (spring Chinook or steelhead) for LSRCP harvest mitigation.

V. TOUCHET SUMMER STEELHEAD

The Touchet River summer steelhead is considered an endemic program. Through BY14, all production was derived from natural parentage broodstock. With BY15, WDFW began incorporating HOR's into the brood stock after agreement from the co-managers. A 4 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. Their progeny have been planted in the North Fork of the Touchet River as yearlings each spring. Starting with BY15, smolts will be trucked to the Dayton AF and allowed 10 to 14 days to acclimate with the screens pulled. At the end of the period, the remaining fish will be pushed out. All adults trapped and handled are anesthetized by electro narcosis (EN).

A. Fish on Hand

Brood Year 2015

After marking was completed in September 2015, LFH had 48,040 Touchet River summer steelhead juveniles on hand. 31,801 of these are HxW crosses and 16,239 are WxW crosses. Spawning in 2015 which provided the production on hand went as planned. Per agreement with the co-managers, WDFW included some hatchery origin fish in the BY15 broodstock.

B. Tagging, Transfers, and Releases

Brood Year 2015

In September, all Touchet River endemic stock steelhead were CWT tagged, with no external fin clips. Pre-smolts will be put into the Dayton AF and allowed to volitional out for 10 to 14 days after the Wallowa stock have been released. These fish are currently not marked for harvest in the sport fishery.

Table 10. Proposed BY15 Touchet summer steelhead smolts tagging, transfers and releases.

Site	BY15 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
WxW-Touchet River (Dayton AF)	25,000	15,500	4.5	1+	100% CWT	5,000	April 2016
HxW - Touchet River (Dayton AF)	25,000	30,000	4.5	1+	100% CWT	5,000	April 2016

C. Trapping

Brood Year 2016

Trapping of BY16 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 mid-April. 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 LFH or Wallowa stock fish are transferred to the Dayton Juvenile Pond to remove them from the river and provide additional fishing opportunities, sacrificed for CWT retrieval or 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. WDFW will spawn a minimum of five (5) females for the brood or the progeny will be released as unmarked/untagged fry. 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. In addition, a new PIT tag array was installed in the lower Touchet River during the summer of 2015 to monitor adult summer steelhead as they pass through the lower Touchet River. A new PIT tag array will be installed between the outlet of the Dayton AF and the dam above the Dayton AF. Anticipated installation will be October – November 2015.

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 to increase the effective breeder population (N_b), 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 successful fertilization of eggs. If not enough males are ripe to achieve this goal; 1:1 spawning is employed. A minimum of five spawned females are needed for each production cycle to occur.

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, picked and enumerated, and placed in hatching baskets suspended over shallow troughs. After hatch and swim-up, the fry are introduced to feed and transferred to the indoor intermediate raceways at around 500 fpp in June. They are transferred again to outside raceways at roughly 200 fpp in July.

Table 11. Proposed BY16 Touchet summer steelhead smolts tagging, transfers and releases.

Site	BY16 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
WxW- Touchet River (Dayton AF)	25,000	25,000	4.5	1+	100% CWT	5,000	April 2017
HxW - Touchet River (Dayton AF)	25,000	25,000	4.5	1+	100% CWT	5,000	April 2017

F. Research

A paired release study will be performed utilizing 10,000 PIT tags. Fish will be tagged in January by WDFW staff, 5,000 WxW and 5,000 WxH. This study will be conducted for four years. Releases of these two study groups will be from the Dayton Acclimation pond after the Wallowa stock has been released. Fish will be held for 10-14 days dependent on water right and water availability. NOAA Fisheries has been contacted to inform them of the changes proposed in the broodstock composition and change of release location through an updated HGMP that is being submitted in the fall/winter of 2015/2016. Since this program is still considered in an "experimental" phase, we don't anticipate any problems.

VI. 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 100,000 smolts at 4.5 fpp, with half of the production for the conservation program and half for the harvest mitigation. The co-managers have agreed to increase production to 150,000, with strategies for implementation of the long term goals for harvest. This increase in production is contingent on other changes to steelhead programs (See **Section IV and VII**) relative to available rearing space or installation of new circular tanks as proposed and the development of a sliding scale and adult management plan for broodstock collection and disposition of hatchery fish at the weir.

A. Fish on Hand

Brood Year 2015

Marking was completed in September 2015 and LFH had 95,347 Tucannon River summer steelhead juveniles on hand. Spawning in 2015 which provided the production on hand went as planned.

B. Tagging, Transfers, and Releases

In September, all Tucannon River endemic steelhead are CWT tagged, with the first 50,000 receiving no external fin clips at LFH (Table 12), but all fish destined for the harvest component

will be 100% adipose fin clipped. In February-March 2016, 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. Releases have been roughly five miles upstream of the TFH, just below the Curl Lake intake structure. Beginning in 2016, WDFW staff would prefer to plant these fish into Curl Lake after the spring Chinook are released. This would require delaying the trout fishing opener in Curl Lake about a week or two. Prior to release, evaluation staff will PIT tag 7,500 fish in this group. The group marked for harvest (balance minus 50,000 conservation group) will be full term reared at Lyons Ferry and released at Marengo Bridge in April or early May. The evaluation staff will PIT tag 7,500 of these prior to release.

Table 12. Proposed BY15 Tucannon summer steelhead smolts tagging, transfers and releases

Site	BY15 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	*PIT Tags	Transfer/Release Date
Tucannon River at Curl Lake	50,000	50,000	4.5	1+	100% CWT Only	7,500	April 2016
Tucannon River (Marengo Bridge)	50,000	44,500	4.5	1+	25,000 AD/CWT 25,000 AD Only	7,500	April 2016

*Note: 15,000 fish will be PIT tagged if BPA funds can be obtained prior to tagging.

C. Trapping

Brood Year 2016

Trapping of BY16 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. All trapped LFH, Wallowa, Tucannon, or other hatchery origin fish with a discernable AD fin clip are placed back downstream of the adult trap for natural spawning. Trapped steelhead from these groups (AD+CWT) are sacrificed to obtain wire information per co-manager agreement.

Current survival estimates indicate that 25-28 spawned females (depending on age structure) will provide enough eggs to meet the current smolt production goal. Per co-manager agreement, WDFW evaluation staff trap up to 30% hatchery endemic origin fish for broodstock, with all other natural origin and hatchery endemic origin fish passed upstream for natural spawning.

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. Also, in the event of IHNV detection, eggs from IHN positive female greater than 10^4 will be destroyed or released into the Tucannon River as un-fed fry following agreement with the co-managers. (See Fish Health Section X).

Co-managers have agreed upon an adult management plan at the Tucannon Adult Trap and sliding scale for broodstock collection for when the program is at the 150,000 smolt release goal. Expansion of the program from 100,000 smolts to 150,000 smolts is pending approval of construction of the circular tank project by LSRCP.

D. Spawning

Based on fecundity, survival estimates, and potential IHN positive females, LFH typically spawns 24-28 females to provide 120,000 green eggs to meet the current conservation and harvest program release goals (Table 13). When smolt production is increased to 150,000, 36 females will most likely be spawned to provide the 180,000 green eggs to meet the conservation goal of 50,000 smolts and harvest goal of 100,000 smolts. 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. WDFW will avoid the possibility of sibling crosses by not crossing a hatchery fish with another hatchery fish.

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 13. Proposed BY16 Tucannon River summer steelhead production.

Site	BY16 Goal	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
Tucannon River (at Curl Lk.)	50,000	4.5	1+	100% CWT Only	**7,500**	April 2017
Tucannon River (Marengo Bridge)	50,000	4.5	1+	25,000 AD/CWT 25,000 AD only	**7,500**	April 2017

F. Research

No research anticipated at this time.

VII. 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). 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 Walla Walla River (100,000), Touchet River from the Dayton AF (85,000), Grande Ronde River from the Cottonwood AF (200,000) and into the Snake River at Lyons Ferry (60,000-160,000 depending on Tucannon Endemic stock production).

A. Fish on Hand

Brood Year 2015

After marking was completed in September 2015, LFH had 494,286 Wallowa stock summer steelhead juveniles on hand. Adults were trapped and spawned at the Cottonwood Creek facility and at ODFW's Big Canyon facility in Oregon. Due to extremely low flows there was not enough water in Cottonwood Creek to operate the acclimation pond and trap adults in 2015 at the same time. Adult collection began three weeks later than normal and not enough fish were trapped for program needs. An additional 30 females were collected by ODFW and Lyons Ferry staff traveled over and spawned the fish. Gametes were collected and transported to LFH in large coolers for fertilization.

B. Tagging, Transfers, and Releases

Brood Year 2015

All of these fish were 100% adipose fin clipped and moved to Lakes #1 and #3 in September, 2015. A portion of the fish were be CWT and will be held in raceways until transfers (Dayton, Cottonwood) or release (on-station or Walla Walla, or Wallowa Hatchery) (Table 14). A portion of these fish will be PIT tagged just prior to release. In February 2016, 142,000 from Lake #3 and the 20,000 marked group will be transferred to the Cottonwood AF for final rearing and

released into the Grande Ronde River. 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 CCAF 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 AP 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).

Also in February 2016, the balance of 66,000 in Lake #3 and the marked 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-April to the end of April 2016. In mid-April, about 80,000 fish from Lake #1 and the 20,000 marked group will be trucked to the Walla Walla River for direct stream release at the McDonald Bridge (RM 32) access site. The final 90,000 from Lake #1 and the 20,000 marked group of fish will be released directly from LFH into the Snake River in mid-April. Each release group will have representative PIT tagging for each rearing type.

Table 14. Proposed BY15 Wallowa stock summer steelhead tagging, transfers and releases.

Site	BY15 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
Cottonwood AF on the Grande Ronde River	140,000 20,000	140,000 20,000	4.5	1+	AD Only AD/CWT	3,000* 3,000*	Transfer to Cottonwood AF in Feb from LFH, release in April 2016
	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	200,000	200,000	4.5	1+	AD Only + AD/CWT	10,000	Combined for all groups
Dayton AF on the Touchet River	65,000 20,000	65,000 20,000	4.5	1+	AD Only AD/CWT	1,500 1,500	Transfer to Dayton AF in February 2016 for release in April
Walla- Walla River	80,000 20,000	80,000 20,000	4.5	1+	AD Only AD/CWT	1,500 1,500	Direct stream release in mid-April 2016
Snake River (On site at Lyons Ferry)	90,000 20,000	90,000 20,000	4.5	1+	AD Only AD/CWT	1,500 1,500	On station release in mid-April 2016.
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 2016

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

C. Trapping

Brood Year 2016

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 140 complete spawned females are needed to provide 600,000 green eggs for the program of 485,000 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. First, release juveniles early and begin trapping adults, second, collection of broodstock at Big Canyon or the Wallowa Hatchery may occur and 3rd, trap at LFH and exclude two salt fish to avoid spawning any LFH stock. 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 Coded-Wire tags, 2) offered to local food banks, or 3) killed outright to prevent hatchery swamping of natural origin spawners. 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. Fry excess to projected program needs will be destroyed or planted in area lakes.

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.

F. Research

See additional document sent with the 2014/2015 AOP, Wallowa Stock rearing/acclimation study proposed by WDFW and ODFW.

Table 15. Proposed BY16 Wallowa stock summer steelhead tagging, transfers and releases.

Site	BY16 Goal	Expected at release	Size (fpp)	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
Cottonwood AF on the Grande Ronde River	140,000 20,000	140,000 20,000	4.5	1+	AD Only AD/CWT	3,000 3,000	Transfer to Cottonwood AF in Feb from LFH, release in April 2017
	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	200,000	200,000	4.5	1+	AD Only + AD/CWT	10,000	Combined for all groups
Dayton AF on the Touchet River	65,000 20,000	65,000 20,000	4.5	1+	AD Only AD/CWT	1,500 1,500	Transfer to Dayton AF in February 2017 for release in April
Walla- Walla River	80,000 20,000	80,000 20,000	4.5	1+	AD Only AD/CWT	1,500 1,500	Direct stream release in mid-April 2017
Snake River (On site at Lyons Ferry)	90,000 20,000	90,000 20,000	4.5	1+	AD Only AD/CWT	1,500 1,500	Direct stream release in mid-April 2017
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 2017

If the Tucannon program is moved to 150k smolt release goal, the goal for the Lyons Ferry release of AD ONLY fish will be reduced from 90k to 40k. ***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).***

VIII. 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 Washington Department of Game determined that in stream habitat improvements, equivalent to the cost of producing 7,000 lbs. annually of hatchery trout, was a reasonable exchange, and that was implemented in 1983, at which reduced the annual production goal to 86,000 lbs. for the Basin. The SE Washington production goal is 79,000 lbs. and the NW Idaho production goal is 7,000 lbs. A small, privately funded program (TSS) at the TFH rears rainbow to1½ 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 2014

At the end of August 2015, LFH and TFH had a combined total of approximately 224,850 Spokane stock rainbow trout on hand, this includes diploids and triploids.

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 2015. All fish for IDFG are triploids from the Spokane stock rainbow trout. Refer to Table 16. Proposed BY 2014 Spokane rainbow trout tagging, transfers and plants for the 2015-16 proposed planting allotment**.**

In spring 2016, 77,000 catchable (2.5 fpp) and 1,000 jumbos (1.5 lbs. each) will be planted by LFH drivers into various lakes in southeast Washington. Spring planting begins in February and is 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, avg.). Planting typically begins in April, and is generally completed by the end of June. The jumbo trout (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 16. Proposed BY 2014 Spokane rainbow trout tagging, transfers and plants

Facility	BY14 Goal	Expected at release	Size (fpp)	Lbs.	Age	Mark/CWT/ Elastomer	PIT Tags	Transfer/Release Date
Lyons Ferry	17,600	17,600	3.0	5,867	1	None	None	Transfer to and planted by IDFG in Sept/Oct 2015
	32,500	32,500	3.0	9,833	1	None	None	Planted in early Oct 2015
	74,000	74,000	2.5	29,600	1+	None	None	Planted in Feb-Apr 2016
	1,000	1,000	0.67	1,493	1+	None	None	Planted in Feb-Apr 2016
	1,650	1650	1.0	1,650	1+	None	None	Transfer to and planted by NPT in Mar-May 2016
Tucannon	94,000	94,000	2.5	37,600	1+	None	None	Planted in Mar-June 2016
	4,000	4,100	0.67	6,119	1+	None	None	Planted in Feb-May 2016

C. Rearing

Brood Year 2015

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).

About 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 Tri-State Steelheaders 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 Tri-State Steelheaders (TSS) organization.

Table17. Proposed BY 2015 Spokane rainbow trout releases.

Site	Number	Size (fpp)	Lbs.	Age	Mark/CWT/ Elastomer	Pit Tags	Transfer/release Date
SE Washington Lakes	32,500 160,000 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 2016 Planted in February through June 2017
IDFG	17,600	3.0	5,867	1	None	None	Transfer to and planted by IDFG in Sept/Oct 2016
NPT	1,650	1.0	1,650	1+	None	None	Transfer to and planted by NPT in Mar-May 2017

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

D. Research

At this time, there is no research planned for this stock.

IX. FISH HEALTH

A. Guiding Policies

All fish production at LFH is conducted according to the co-managers Salmonid Disease Control Policy 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. Bacterial kidney disease (BKD) management for Chinook stocks and Infectious Hematopoietic Necrosis (IHN) management for steelhead stocks are outlined in Section C

Currently, IHN in Chinook salmon is not a concern at LFH. The strains of IHN found in the Columbia River Basin have been problematic for sockeye, steelhead and rainbow trout, but not for Chinook salmon. Therefore, standard hatchery practices of egg disinfection and use of pathogen-free rearing water during early rearing have been sufficient fish health measures.

The fish health specialist will respond to all fish disease outbreaks at the request of the hatchery staff.

B. Monitoring

The fish health specialist will visit LFH and TFH at least once a month. Mortality records and fish in all rearing containers will be inspected. Approximately 5 - 10 fish of each species may be killed and examined at the discretion of the fish health specialist.

At spawning, all broodstock will be tested for viral pathogens. Ovarian fluid and kidney/spleen samples from at least 60 females will be tested.

To comply with Idaho's fish import regulation, a 60 fish sample of kidney/spleen from rainbow trout will be tested for viral pathogens 4 to 6 weeks before transfer. Upon completion, results will be communicated to IDFG.

C. Specific Fish Health Management

1. BKD Management – Fall Chinook

The co-managers agreed to discontinue injecting female broodstock in 2013. All females for use in the yearling production and eggs shipped to the states of Oregon and Idaho will be tested for BKD using ELISA method.

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 300 adults at LFH. Progeny of all low, moderate and high BKD-ELISA females and untested females may be utilized in the subyearling fall Chinook program for NPT and WDFW.

It has been determined that the adult sampling protocols are controlling the risk of an outbreak of BKD, along with the concerns of post treatment stress, and an increase in the number of drop-outs occurring in the fry. If BKD prevalence increases to 2% or above, then more extensive sampling requirements will be implemented.

2. BKD Management – Spring Chinook

All spring Chinook broodstock will receive a pre-spawning injection with Tulathromycin and oxytetracycline. All females will receive a second injection 30 days prior to spawning. All female spring Chinook will be tested for BKD using ELISA assay. No segregation or culling will occur.

A prophylactic aquamycin treatment at a 3% dose has been used in the past to help in the prevention of BKD with the Tucannon Spring Chinook juveniles. Starting with BY14, this treatment was no longer administered. If needed in the future due to disease concerns we will revisit this preventative measure. The 28-day treatment had been administered in mid-January thru mid-February when the fish were approximately 400 fpp.

3. IHN Management – Summer Steelhead

All female steelhead broodstock will be tested for IHN virus via cell culture and the IHN virus levels in the ovarian fluid will be determined. Eggs from Wallowa stock females with high levels of IHN virus ($>10^3$) will be destroyed. Eggs from negative and low IHN virus (10^1 to 10^3) females will be reared separately until combining occurs when they are tagged into the lakes.

Eggs from the Tucannon and Touchet endemic programs with high levels of IHN virus ($>10^4$) may be destroyed, reared separately or planted into their respective streams as fry, pending agreement among the co-managers. Eggs from negative and low IHN virus (10^1 to 10^4) females will be reared separately.

If IHN outbreaks occur in any fish-rearing vessel, fish from the affected rearing container will be promptly isolated and may be destroyed.

4. Broodstock and Egg Fungus Management

All adult Chinook and steelhead held for broodstock 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 at 7 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.

Literature Cited

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Williamson, K. S., A. R. Murdoch, T. N. Pearsons, E. J. Ward, and M. J. Ford. 2010. Factors influencing the relative fitness of hatchery and wild spring Chinook Salmon (Oncorhynchus tshawytscha) in the Wenatchee River, Washington, USA. Can. J. Fish. Aquat. Sci. 67: 1840-1851.

X. 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.

Table 18. Contact List.

Name	Agency	Position	Phone	E-mail
Policy				
Julie Collins	USFWS	LSRCP Project Lead	208-378-5668	julie_collins@fws.gov
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Chris Donley	WDFW	Region 1 Fish Mgmt.	509-892-7861	christopher.donley@dfw.wa.gov
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Evaluation				
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Jason Vogel	NPT	Research Division	208-621-3602	jasonv@nezperce.org
Stuart Rosenberger	IPC	Hatchery M&E Biologist	208-388-6121	srosenberger@idahopower.com
Management				
Jeremy Trump	WDFW	Fish Management	509-382-1005	Jeremy.Trump@dfw.wa.gov
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Joe Dupont	IDFG	Regional Fisheries Manager	208-799-5010	Joe.DuPont@idfg.idaho.gov
Fish Health				
Sam Onjukka	ODFW	Fish Pathologist	541-962-3823	sam.t.onjukka@state.or.us
Steve Roberts	WDFW	Fish Health Specialist	509-892-1001 Ext 300	steven.roberts@dfw.wa.gov

Appendix A: 2015 Requests for Fall Chinook Production Fish/Eggs
(2015 Broodyear)

Priority under USvOR	Who	Release site	Age	# for release	Transfer (unrounded)	Survival to release or transfer (revised 6/16/14)	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		96.0%	1.042	468,994	96.0% mean survival, 2009-2012BY	468,994
4	NPT	CJ	yearlings	150,000	151,515	93.7%	1.067	160,085	99.0% survival transfer to rel BY07-11	949,249
3	NPT	BC	yearlings	150,000	151,515	93.7%	1.067	160,085	3.3% green to eye, est 2% eye-transf, 1% transf-rel	789,164
2	NPT	PIT	yearlings	150,000	151,515	93.7%	1.067	160,085		629,079
				900,000					949,250	
5	WDFW	onstation	subs	200,000		94.7%	1.057	211,305	94.7% mean survival, 2009-2012BY	1,160,554
6	NPT	CJ	subs	500,000	501,002	94.7%	1.057	531,062	94.0% survival to transfer for subs	1,691,616
7	NPT	BC	subs	500,000	501,002	94.7%	1.057	531,062		2,222,678
11	WDFW	acclim-(CJ2)	subs	200,000	200,401	94.7%	1.057	212,425		3,087,461
8	NPT	PIT	subs	200,000	200,401	94.7%	1.057	212,425		2,435,103
10	NPT	PIT	subs	200,000	200,401	94.7%	1.057	212,425		2,875,036
				1,800,000					1,910,704	
12	DNFH/Irrigon	Transportation	eyed eggs	250,000		96.3%		0		
13	WDFW/Irrigon	GRR-direct rel	eyed eggs	200,000	220,000	96.7%	1.034	227,508	3.3% green-eye loss BY09-13	3,314,969
16	WDFW/Irrigon	GRR-direct rel	eyed eggs	200,000	220,000	96.7%	1.034	227,508		3,769,985
14	DNFH/Irrigon	Transportation	eyed eggs	78,000		96.3%		0		
9	IPC-Oxbow	HC Dam	eyed eggs	200,000	220,000	96.7%	1.034	227,508		2,662,611
15	IPC-Umatilla	HC Dam	eyed eggs	200,000	220,000	96.7%	1.034	227,508		3,542,477
17	IPC-Umatilla	HC Dam	eyed eggs	600,000	660,000	96.7%	1.034	682,523		4,452,508
				1,400,000	3,597,752				1,592,555	
				4,100,000	**released**			**4,452,508**	**green eggs to meet needs through priority 17**	
								1154	BY11-13 LGR (3860 eggs/F)excluding jills	

number of Snake River origin females needed to spawn

Appendix B: 2015 Fall Chinook Trapping/Sampling Protocols at LGR

by

Debbie Milks, WDFW
Bill Arnsberg/Bill Young, NPT
Stuart Rosenberger, IPC
September 18, 2015

On 9/16/15 it was determined that protocols would need to change or else broodstock needs would have been met too early in the run. At 1:30pm on 9/16/15 Darren Ogden was directed to pass all fall Chinook until a revised sampling protocol could be agreed to. In an effort to collect fish across the run for broodstock, have the flexibility to select larger older aged fish, increase the proportion of unmarked/untagged potentially wild fish in broodstock, target a 1x1 spawning matrix, and assure run reconstruction needs are met, the following changes were agreed to by the co-managers on a conference call on 9/17/15:

The trapping rate will remain set at 12%.

Wire tagged fish:

Fork Length	Action
≥ 80cm	Haul all wires (no scales collected)
79-70	RELEASE ALL (no scales collected)
<70 cm	Haul 1 out of 5 wires (put F in with "LARGES" and M go into "SMALLS" tank)
	RELEASE 4 out of 5 wires (no scales collected)

No Wire

AD only	RELEASE ALL (collect scales, 1 in 3 will be processed)
AD+PIT tag	RELEASE ALL (collect scales, 1 in 3 will be processed)
PIT tag only	RELEASE ALL (collect scales, 1 in 3 will be processed)

Unmarked/Untagged (Potentially wild fish)

Fork Length	Action
≥85 cm Females ≥ 75 cm Males	Haul all fish (collect scales, 1 in 3 will be processed) data will be used to document arrival timing and profile the run for reconstruction needs.
<85 cm Females <75 cm Males	Release all (collect scales, 1 in 3 will be processed) data will be used to document arrival timing and profile the run for reconstruction needs.

Appendix C: 2015 Trapping & Mating Protocol at LFH

LFH may start up the volunteer trap if a shortfall of females being collected at LGR happens or if high water temperatures delay trapping. Staff will target fish >80 cm to increase numbers of older aged fish for broodstock. The size criteria will be further relaxed to 75 cm in mid-October if necessary.

Sorting protocol

Sort LFH trapped fish during first spawn in October.
Count and sex all fish: 1) Males and females ≥ 75, 2) Males and females <75.

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

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.

Strays will be culled based on CWTs. If broodstock limited, up to 60 stray females may be spawned and retained, presuming 1200 matings are needed to make production1. All stray males will be culled. 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.

Jills

Jills will be cycled back to the holding pond for the first three weeks. If we have enough adult females to make production goals, jills will not be used in production. If jills are used for broodstock they will be kept separate until a decision can be made regarding what to do with the eggs. 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.

NOTE: THE PBT PROPOSAL COVERS SAMPLING OF PRODUCTION GROUPS LISTED IN US V OREGON B4B. **PRODUCTION FROM JILLS ARE IN EXCESS OF B4B GOALS AND ARE THEREFORE NOT FUNDED THROUGH THE PROPOSAL**.

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 2015:

- Pittsburg Landing – April 12
- Captain John Rapids – April 1
- Big Canyon – April 13

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 24
- Captain John Rapids first group – May 23
- Captain John Rapids second group – June 10
- Big Canyon – May 25

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.

FCAP contact list:

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Appendix E: 2016 Releases - Fall Chinook Pit Tag Allocation (*USvOR* agreement)

Summary of PIT tag allocation for release year 2015 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 A - 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 =	373	at trap	Total predict. HOR=	574	
Predicted NOR =	356	at trap	Total predict. NOR=	548	
Tot. Est Return at Trap =	729	at trap			
Total River Return =	1,122	w/ 35% below trap		1122	
Brood Target =	140				

Dispostion Table

NOR Brood	NOR SpEsc	HOR Brood	HOR SpEsc	Program Size	Tribal & Nontribal Harvest	Tribal & Nontribal Transfer	PNI Prior to harvest or transfer PNI
110	364	30	462	225,000	0	0	0.58

w/o harvest or transfer mgmt

pNOB= 0.79
pNOS= 0.44
pHOS= 0.56

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	90	36%	0	283	283	0.0%	27	484	511	651	434	23	5.3%	411	94.7%
100	50	90	36%	50	283	333	15.0%	104	484	588	728	500	88	17.7%	411	82.3%
150	75	65	54%	75	308	383	19.6%	156	509	665	805	565	132	23.4%	433	76.6%
200	85	55	61%	115	318	433	26.6%	223	519	742	882	630	189	30.0%	441	70.0%
250	85	55	61%	165	318	483	34.2%	300	519	818	958	696	255	36.6%	441	63.4%
300	100	40	71%	200	333	533	37.5%	362	534	895	1035	761	307	40.4%	454	59.6%
350	110	30	79%	240	343	583	41.2%	428	544	972	1112	826	364	44.1%	462	55.9%
400	130	10	93%	270	363	633	42.7%	485	564	1049	1189	892	413	46.3%	479	53.7%
450	140	0	100%	310	373	683	45.4%	552	574	1126	1266	957	469	49.0%	488	51.0%
500	140	0	100%	360	373	733	49.1%	629	574	1203	1343	1023	535	52.3%	488	47.7%
550	140	0	100%	410	373	783	52.4%	706	574	1280	1420	1088	600	55.2%	488	44.8%
600	140	0	100%	460	373	833	55.2%	783	574	1357	1497	1153	666	57.7%	488	42.3%
650	140	0	100%	510	373	883	57.8%	860	574	1434	1574	1219	731	60.0%	488	40.0%
700	140	0	100%	560	373	933	60.0%	937	574	1511	1651	1284	796	62.0%	488	38.0%
750	140	0	100%	610	373	983	62.1%	1014	574	1588	1728	1350	862	63.9%	488	36.1%
800	140	0	100%	660	373	1033	63.9%	1091	574	1665	1805	1415	927	65.5%	488	34.5%
850	140	0	100%	710	373	1083	65.6%	1168	574	1742	1882	1480	993	67.0%	488	33.0%
900	140	0	100%	760	373	1133	67.1%	1245	574	1818	1958	1546	1058	68.4%	488	31.6%
950	140	0	100%	810	373	1183	68.5%	1322	574	1895	2035	1611	1123	69.7%	488	30.3%
1000	140	0	100%	860	373	1233	69.7%	1398	574	1972	2112	1676	1189	70.9%	488	29.1%
1100	140	0	100%	960	373	1333	72.0%	1552	574	2126	2266	1807	1319	73.0%	488	27.0%
1200	140	0	100%	1060	373	1433	74.0%	1706	574	2280	2420	1938	1450	74.8%	488	25.2%
1300	140	0	100%	1160	373	1533	75.7%	1860	574	2434	2574	2069	1581	76.4%	488	23.6%
1400	140	0	100%	1260	373	1633	77.2%	2014	574	2588	2728	2200	1712	77.8%	488	22.2%
1500	140	0	100%	1360	373	1733	78.5%	2168	574	2742	2882	2330	1843	79.1%	488	20.9%

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