Infrastructure and Operations Audit of the McCall Fish Hatchery 2022

McCall Fish Hatchery
Lower Snake River Compensation Plan

Jamie Mitchell
Idaho Department of Fish and Game

Chris Starr
U.S. Fish and Wildlife Service

Contacts

McCall Fish Hatchery
Idaho Department of Fish and Game
Jamie Mitchell
Hatchery Manager
300 Mather Rd
McCall, ID 83638
Phone: 208-634-2690
E-mail: jamie.mitchell@idfg.idaho.gov

Idaho Department of Fish and Game
Bob Becker
Complex Manager
300 Mather Rd
McCall, ID 83638
Phone: 208-899-0845
E-mail: bob.becker@idfg.idaho.gov

Idaho Department of Fish and Game
Cassie Sundquist
Production Program Coordinator
600 S Walnut
Boise, ID 83707
Phone: 208-287-2780
E-mail: cassie.sundquist@idfg.idaho.gov

U.S. Fish and Wildlife Service
Chris Starr
Facility Coordinator
Lower Snake River Compensation Plan Office
1387 S Vinnell Way, Suite 343
Boise, ID 83709
Phone: 208-514-5644
E-mail: chris_starr@fws.gov

U.S. Fish and Wildlife Service
Nathan Wiese
Program Coordinator
Lower Snake River Compensation Plan Office
1387 S Vinnell Way, Suite 343
Boise, ID 83709

Executive Summary

On June 23, 2022, Chris Starr, Facility Coordinator LSRCP, Nathan Wiese, Program Coordinator LSRCP, Jamie Mitchell, McCall Hatchery Manager, and Bob Becker, IDFG Complex Manager, conducted a high-level one-day infrastructure and operations assessment of the McCall Fish Hatchery. Cassie Sundquist, Beau Gunter, Chris Sullivan, and John Cassinelli, IDFG, provided review of this document.

The purpose of this document is to provide the Lower Snake River Compensation Plan (LSRCP) and other stakeholders ample conceptual-level information of the current infrastructure challenges. The goal is to incorporate audit findings into a 10-year strategic plan for LSRCP that will maximize in-house and external improvement opportunities by developing solutions that fit resources, budgets, and supportive programs in a logical sequence. These efforts are intended to significantly improve water quality, program capacity, efficiency, and flexibility at the facility and ultimately increase opportunities for LSRCP to meet adult mitigation targets.

This audit is a kick-off effort to assess all spring/summer Chinook rearing facilities within the LSRCP program prior to the 10-year spring/summer Chinook Program Review for the Independent Scientific Review Panel (ISRP) in December 2022. With this review, the LSRCP intends to identify strategies toward improving performance of achieving project area goals of 58,700 spring/summer Chinook salmon adult returns. From 2004-2017, the LSRCP averaged 29,115 spring/summer Chinook salmon adult returns and failed to achieve the project area goal on any year during the period.

To maximize the production capacity of McCall Fish Hatchery three new smolt production rearing opportunities have been identified. The first is rearing 300,000 smolts in the new adult holding ponds slated for construction in 2023. The second is rearing an additional 40,000 smolts in the collection rearing basin and the third is increasing the current rearing ponds by 200,000 (20%) within established final rearing density index, (DI) parameters.

Incrementally Maximize production capacity of McCall Fish Hatchery

Program	Current Smolts	Proposed Smolts
New Adult Holding Ponds	0	300,000 - 150K Johnson Creek and 150K INT
Collection Rearing Basin	150,000	190,000 Segregated (move Johnson Creek to a new adult holding pond)
Rearing Ponds	1,000,000	1,200,000 SEG
Total	**1,150,000**	**1,690,000**

Table of Contents

1 Scope

On June 23, 2022, Chris Starr, Facility Coordinator LSRCP, Nathan Wiese, Program Coordinator LSRCP, Jamie Mitchell, McCall Hatchery Manager, and Bob Becker, IDFG Complex Manager, conducted a high-level one-day infrastructure and operations assessment of the McCall Fish Hatchery.

The purpose of this document is to provide the Lower Snake River Compensation Plan (LSRCP) and other stakeholders with ample conceptual-level information of the current infrastructure challenges. The goal is to incorporate audit findings into a 10-year strategic plan for LSRCP that will maximize in-house and external improvement opportunities by developing solutions that fit resources, budgets, and supportive programs in a logical sequence. These efforts are intended to significantly improve water quality, program capacity, efficiency, and flexibility at the facility and ultimately increase opportunities for LSRCP to meet adult mitigation targets.

This audit is a kick-off effort to assess all spring/summer Chinook rearing facilities within the LSRCP program prior to the 10-year spring/summer Chinook Program Review for the Independent Scientific Review Panel (ISRP) in December 2022. With this review, the LSRCP intends to identify strategies toward improving performance of achieving project area goals of 58,700 spring/summer Chinook salmon adult returns. From 2004-2017, the LSRCP averaged 29,115 spring/summer Chinook salmon adult returns and failed to achieve the project area goal on any year during the period.

2 Background

McCall Fish Hatchery is part of the Lower Snake River Compensation Plan (LSRCP). The LSRCP has an annual cumulative project area goal of 58,700 spring/summer Chinook salmon adult returns to mitigate survival reductions resulting from construction and operation of the four lower Snake River dams. However, from 2004-2017, the program failed to reach that goal and averaged 29,115 adult returns (USFWS 2020).

As part of the LSRCP, the McCall Fish Hatchery has a target to return 8,000 summer Chinook salmon above Lower Granite Dam.

The South Fork Salmon River Chinook Salmon is in the Snake River Spring/Summer Chinook Salmon ESU which was listed as threatened under the Endangered Species Act in 1992 (57 FR 14,653; April 22, 1992). The MPG includes four populations: the Little Salmon River, Secesh River, East Fork of the South Fork Salmon River and the South Fork Salmon River mainstem populations (HGMP 2011).

McCall Fish Hatchery (Hatchery) is located on the North Fork Payette River adjacent to Payette Lake in McCall, Idaho, and was completed in 1981. The Hatchery is located on a site formerly occupied by an IDFG trout hatchery, that was selected for a site for salmon production because it was accessible year around, had a known water supply, and suitable infrastructure was available to support construction and operation of the facility. Adult collection and spawning is conducted at the South Fork Salmon Satellite, located near Warm Lake on the South Fork Salmon River approximately 50 miles (80 km) southeast of the hatchery.

Up to 1,489 adults are collected annually to contribute one million smolts (850,000 segregated and 150,000 integrated) released in the South Fork Salmon River, 300,000 eyed eggs to the Shoshone-Bannock egg box program and 770,000 green eggs for development of the summer Chinook program in the South Fork Clearwater River.

In addition, approximately 102 natural origin Johnson Creek adults are also retained for broodstock. The Johnson Creek program for Bonneville Power Administration rears an additional 150,000 Chinook smolts in the Collection Basin of McCall Hatchery.

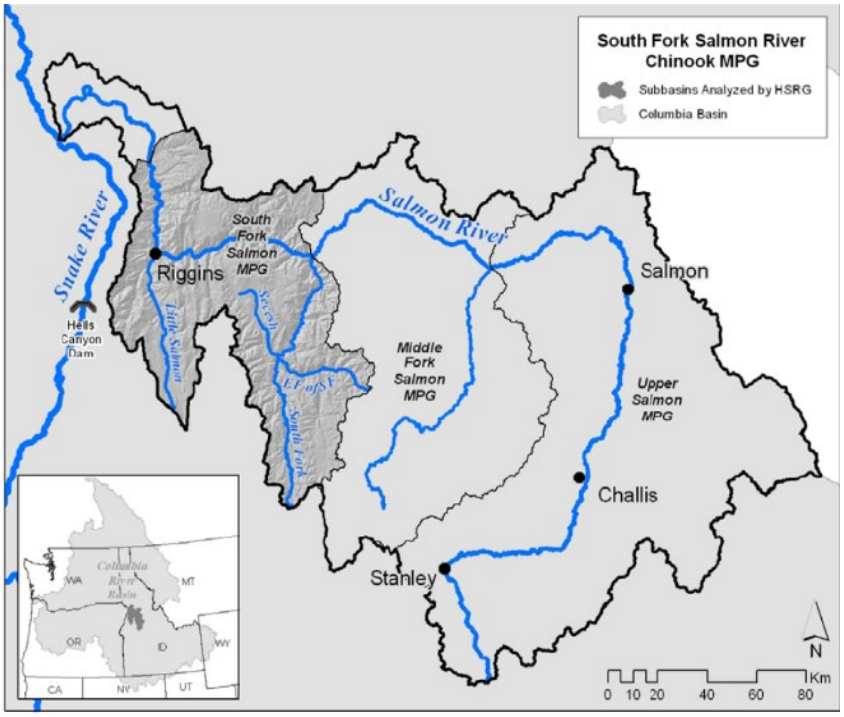
In 2011, Idaho Department of Fish and Game assessed the average (1980-2009) escapement to Lower Granite Dam of 4,400 adults, and estimated the production capacity at this facility needs to be increased from one million to 1.82 million yearling smolts to return 8,000 adults to the project area (HGMP 2011).

$$\frac{4{,}400 \text{ adults}}{1{,}000{,}000 \text{ smolts}} = \frac{8{,}000 \text{ adults}}{\text{X smolts}} = 1{,}820{,}000 \text{ smolts}$$

More recent data (BY1993-2017) suggests an average Smolt to Adult Survival (SAS) of 0.85% and project area Smolt to Adult Return (SAR) of 0.80% which would achieve the 8,000 adults per project area goal on average. However, despite the success at McCall Fish Hatchery, the LSRCP program has only returned an average 50% of its adult targets since inception (USFWS 2020) and is seeking opportunities to increase overall adult returns especially to the Salmon River basin.

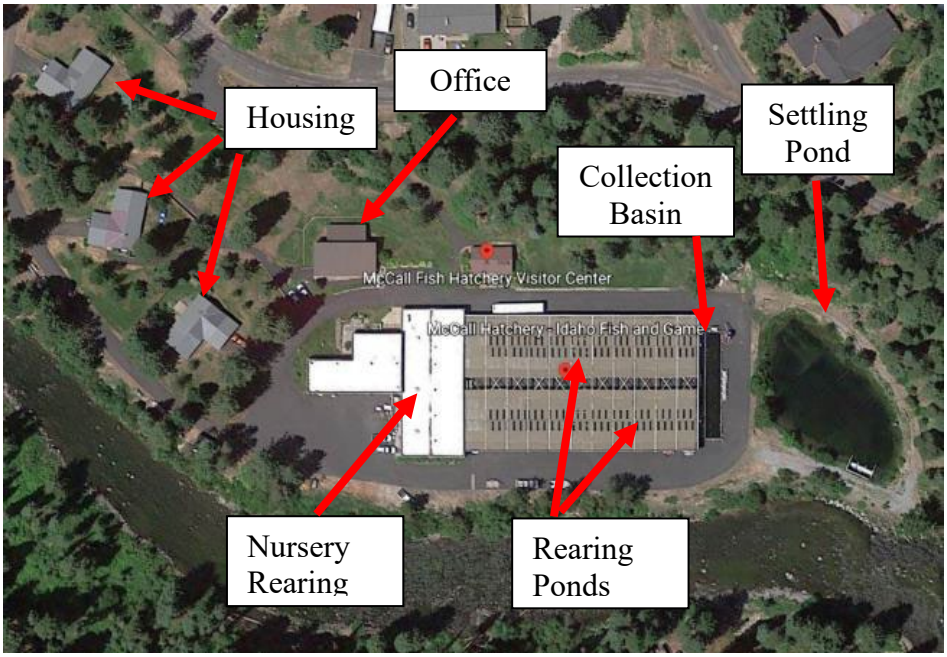
McCall 5-year average performance of smolts onsite is excellent with Green to Eyed survivals at 92% and Eyed to Smolt survivals of 95%. March is generally the production bottleneck for the facility when the North Fork of the Payette River flows into Payette lake drop and available water to the hatchery dips to 12.5 cfs. During March, outdoor smolts are reaching release size of 18-20 fpp and indoor early rearing of the next brood year requires up to 5 cfs as they reach 600 fpp.

McCall Fish Hatchery, 5-year Average Performance Metrics (AOP 2022)	
Disease Culling	5%
Green to Eyed	92%
Eyed to Smolt	95%



Source: HSRG 2009

McCall Fish Hatchery



McCall Fish Hatchery summer Chinook releases and returns.

Brood Year	Smolts Released	SAS	Adults
1993	763,705	0.62%	4,735
1994	351,340	0.15%	527
1995	122,766	1.02%	1,252
1996	393,872	1.38%	5,435
1997	1,055,673	2.17%	22,908
1998	845,244	1.99%	16,820
1999	1,077,077	0.82%	8,832
2000	1,062,870	1.41%	14,986
2001	1,054,242	0.60%	6,325
2002	914,060	0.42%	3,839
2003	1,047,530	0.37%	3,876
2004	1,094,264	0.98%	10,724
2005	1,087,170	1.10%	11,959
2006	1,060,540	2.15%	22,802
2007	1,106,700	0.83%	9,186
2008	1,037,600	0.91%	9,442
2009	1,069,028	0.41%	4,383
2010	1,028,353	0.86%	8,844
2011	1,074,850	1.43%	15,370
2012	1,047,885	0.65%	6,811
2013	1,122,286	0.21%	2,379
2014	1,028,382	0.47%	4,823
2015	1,107,910	0.28%	3,091
2016	1,122,103	0.05%	505
2017	1,106,987	0.24%	2,635
AVG	951,297	0.85%	8,100

2.1 Infrastructure

2.1.1 Hatchery Water Supply

The Hatchery receives water through an underground 36-inch gravity line from Payette Lake. Water may be withdrawn from the surface or a deep water intake 50 ft below the normal summer water level. IDFG has an agreement with the Lake Reservoir Company to withdraw up to 20 cfs with an additional 3 cfs for irrigation needs. The two intakes are connected to a mixing box located at Lardo Dam which allows for limited temperature control during the summer. Summertime water temperature is maintained at 52 F to 56 F by mixing between surface and deep water intakes. Water temperatures reach a low 37 F in mid-winter and seven feet of lake drawdown from November to April result in only 12.5-13.5 cfs available for fish production during those months which is solely derived from the deep intake.

Annual maintenance involves inspection of water control valves and applying grease as needed to ensure smooth operation as well as visual inspection of the surface intake. Periodic underwater inspection of the deep intake by professional divers which includes video inspection of water pipelines should be performed on a 25-30 year cycle. The last such inspection took place in July of 2015 (HGMP 2011). Prior to being divided for single pass use through the facility water flows through a wedge wire grate to remove debris. This screen is brushed clean daily and should be pressure washed annually to ensure efficient operation.

2.1.2 Broodstock Collection

Adult summer chinook salmon are collected at the South Fork Salmon River weir near Warm Lake. The facility consists of a permanent bridge structure, removable weir panels, fish ladder, trap, three adult holding ponds (10 ft x 90 ft), a covered spawning area, and a crew dormitory. The holding capacity for the facility is approximately 1,400 adult salmon. Adults are collected and spawned at this facility. Fertilized eggs are transported to the McCall Fish Hatchery for incubation, hatch, and rearing through release.

A new permanent bridge, supporting pivoting weir panels, was completed for the 2007 adult return year. The design of this structure also includes a concrete sill that runs below the bridge across the river.

Water is supplied from the South Fork Salmon River to the facility through a 33-inch underground pipeline.

Johnson Creek adults are trapped, marked and transported by NPT staff to the SFSR holding ponds where they held in common with South Fork stock.

Broodstock are sampled according to IDFG Fish Health protocols.

Eggs collected and fertilized at the South Fork Salmon River weir facility are water-hardened in 100 ppm iodine for one hour and then transported to McCall FH for incubation.

South Fork Salmon Weir Facility

2.1.3 Incubation

Segregated eggs are loaded into trays at two females per tray and integrated and Johnson Creek eggs are incubated at 1-female per tray. Maximum incubation tray densities are 9,000 eggs per tray (two females = Average 8,600) at 5 gpm. IHOT maximum standard is 8,000 eggs per tray. The McCall Fish Hatchery has 40, eight-tray vertical incubation stacks (Heath-type) for a total of 320 trays available for incubating eggs.

Fry are transferred to indoor vats for early rearing at swim-up (1,700 – 1,750 FTU's).

2.1.4 Nursery Rearing

Rearing facilities at the McCall Fish Hatchery include 14 concrete vats (4 ft wide x 40 ft long x 2 ft deep) used for early rearing.

At swim-up, MCFH program SFSR summer Chinook fry are transferred into 12 indoor vats with screens initially placed at ½ vat length. Fry are set out in a manner to allow for spawn timing proportionality representation for CWT and individual pond marking. Approximately 90,000-100,000 fry are set out in each vat. Flows are set at 80 gpm then increased to 140 gpm (maximum) when fry are well on feed and vats are extended to full length. Individual vats are extended to full length when the density index reaches 0.50 to 0.60. Density (DI) and flow (FI) indices are maintained at DI < 0.55 and FI <1.5.

Initial feeding occurs between 1925 and 1950 TU's or up to 14 days post set out to reduce the occurrence of a *Phoma herbarum,* a fungal infection in the underdeveloped air bladder and/or the digestive tract. Hourly hand feeding during the day commences after this extended period of morphological development expires. Extruded starter feed in the BioVita formula, produced by Skretting/BioOregon, is used during early rearing. With a few exceptions, feed size transitions occur consistent with Skretting/BioOregon guidelines.

Initial growth rates in the nursery tanks are slow, approximately 0.003-0.004-inch per day, due to water temperatures of only 37-39°F.

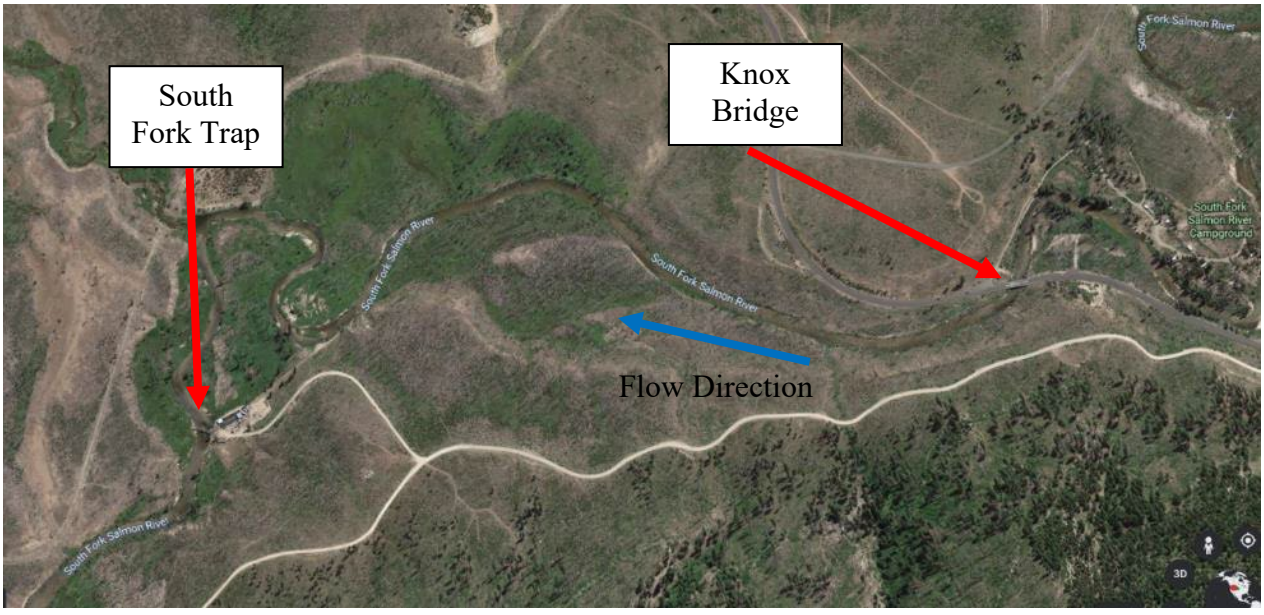
2.1.5 Outdoor Rearing

Outdoor rearing occurs in two concrete ponds (40 ft wide x 196 ft long x 4.5 ft deep) and one concrete collection basin (15 ft wide x 101 ft long x 4 ft deep) where Johnson Creek smolts are reared. At time of release density and flow indices do not exceed 0.25 and 2.00, respectively. The 2 rearing ponds are covered with a solid roof and open sides however the collection basin was not originally designed for fish rearing and is not covered.

During final rearing, outside raceways are cleaned every other day or as needed, but dead fish are removed daily.

2.1.6 Release

Yearling smolts are transported at 20 fpp to the Knox Bridge on the South Fork Salmon River in April for release. Transport takes approximately 2-4 hours per trip and is completed at up to 1 pound of fish per gallon of water.



2.1.7 Settling Pond

All process water used for fish culture passes through the hatcheries outdoor settling basin to removed settable solids prior to being discharged into the North Fork Payette River. The settling basin is an earthen depression with a clay bottom; a concrete outflow structure is in place with piping extending to the river at river bottom grade. Annually, the fence surrounding the settling basin needs to be retightened as a documented safety measure to discourage access by hatchery visitors. Muskrats must be periodically removed to prevent bank degradation.

Periodically, hatchery flow needs to be diverted and water removed from the settling basin to allow for the removal of accumulated waste materials and should be done on a 25-30 year cycle. It is unclear when the last such cleaning took place, some records indicate December of 1993 and others indicate January 1999. The facility exceeded its NPDES phosphorus discharge limits as recently as December of 2022. The Hatchery staff are working on a plan to remove accumulated settling pond waste in FY2023 to address this issue.

2.1.8 NPDES

The facility exceeded its NPDES Total Phosphorus Annual Maximum discharge of 480.6 lbs per day in 2020, 2021 and 2022. The Hatchery staff are working on a plan to remove accumulated settling pond waste in FY2023 to help address this issue. If annual Total Phosphorus limits do not decrease after dredging the settling pond additional operational changes will need to be completed to further reduce Total Phosphorus before any additional production could be added to McCall's production.

3 Operations

3.1.1 Marking

Parr are marked into outdoor rearing ponds during June and July mark sessions. Currently, all segregated SFSR summer Chinook are AD-clipped, and approximately 120,000 of these also receive CWT. All integrated Chinook are given CWT's only (no AD clip). Segregated fish that receive a CWT are distributed equally between the outdoor ponds. The majority of fish are MATS marked and moved into outdoor ponds during the AD only marking event in June and the AD and CWT mark and tag event in July at < 150 fpp.

Following the first round of marking in mid-June, remaining fry are subdivided into 5 of the emptied vats to provide space for continued rearing (40,000 to 55,000 in 11 vats). Remaining indoor fry are moved to the outdoor ponds via the MATS Automated Marking Trailer during the in July. Any additional production will require moving fish outside before marking and will put added strain on the Fish Marking program during their busiest time of the year.

3.1.2 PIT Tagging

PIT tags are inserted into 52,000 juveniles in October. Of this total, 26,000 are segregated and 26,000 are integrated production smolts.

4 Operational/Infrastructure Changes for Program Efficiency

4.1.1 New Adult Holding Pond

Two new adult holding ponds are scheduled to be completed in Fiscal Year 2023. These ponds will provide holding for up to 1280 adult spring Chinook salmon and are needed to replace the South Fork Salmon river holding location that has experienced lethal holding temperatures (>70 in the past 6 of 8 spawning seasons. The pond is sized for current broodstock trapping needs.

The new rearing space is 7,600 cubic feet per pond (15,200 ft3 total) and could provide rearing space for up to 300,000 smolts to 20 fpp and keep smolts at a Density Index of 0.2. The current max DI for final rearing at McCall is 0.2. Providing water to the holding ponds from September until March (release) could be accomplished by reusing water from the current hatchery building (approximately 2,000 gpm) or by pumping water back from the tail race of the Collection Chamber. Re-using hatchery building water would maintain a Flow Index below 1.72. JCAPE and Integrated stocks would need to be marked back into vats and held until September and the Segregated stock would need to be moved into the rearing ponds before marking to accommodate increased production. This strategy would complicate fish marking.

4.1.2 Optimize Collection Basin Rearing

Currently, the Johnson Creek smolt program (150,000 smolts at 20 fpp) is reared in the collection basin to meet Bonneville Power Administration smolt goals. The number of smolts reared in this location could be increased to 190,000 smolts while still maintaining Density Index criteria. However, the National Oceanic and Atmospheric Administration (NOAA) has reviewed the Johnson Creek program and does not need additional hatchery supplementation smolts in the Johnson Creek system. Moving Johnson Creek to the new holding ponds (150K per pond) would provide space to rear an additional 190,000 segregated smolts in the collection basin.

4.1.3 Potential Optimization of Rearing Ponds

Rearing ponds are currently operated at 500,000 each for a total of 1 million smolts (850K segregated and 150K integrated) at a final rearing density of 0.2. From past experience, the facility management is confident that final rearing density can be increased to 0.24 which would put total

rearing at 1.2M. Since McCall has historic high Smolt to Adult (SAR = 0.86) survival rate, this option is likely the lowest priority. Although simple to implement, maintaining the successful program with current low Density Indices may be preferable while experimenting is done in the other rearing containers.

Maximize production capacity of McCall Fish Hatchery

Program	Current Smolts	Proposed Smolts
New Adult Holding Ponds	0	300,000- (150K Johnson Creek and 150K Int)
Collection Rearing Basin	150,000	190,000 Segregated (move Johnson Creek to a new adult holding pond)
Rearing Ponds	1,000,000	1,200,000 Seg
Total	**1,150,000**	**1,690,000**

5 References

Annual Operation Plan (AOP). 2022. Annual Operation Plan for Salmon and Steelhead Production Programs in the Salmon and Snake River Basins. Prepared by Idaho Department of Fish and Game, Nez Perc Tribe, Shoshone-Bannock Tribes, U.S Fish and Wildlife Service, and Idaho Power Company. https://www.fws.gov/sites/default/files/documents/2022%20Salmon-Snake%20AOP.pdf

Hatchery Genetic Management Plan (HGMP). 2002. Salmon River Basin Summer Chinook Salmon. McCall Fish Hatchery. Idaho Department of Fish and Game. September 30, 2002. https://www.fws.gov/sites/default/files/documents/McCall%20HGMP.pdf

Hatchery Genetic Management Plan (HGMP). 2011. South Fork Salmon River Summer Chinook. Idaho Department of Fish and Game. December 21, 2011. https://www.fws.gov/sites/default/files/documents/McCall%20South%20Fork%20Salmon%20River%20Summer%20Chinook%20HGMP.pdf

Hatchery Scientific Review Group (HSRG). 2009. Hatchery reform system wide report. September 2009. https://www.streamnet.org/app/hsrg/docs/01_HSRG-CRB_Final-Systemwide-Report[1].pdf

U.S. Fish and Wildlife Service (USFWS). 2011. Review of Idaho Lower Snake River Compensation Plan State-Operated Hatcheries, Clearwater, Magic Valley, McCall, and Sawtooth Fish Hatcheries: Assessments and Recommendations. Final Report, March 2011. Hatchery Review Team, Pacific Region. U.S. Fish and Wildlife Service, Portland, Oregon.

U.S. Fish and Wildlife Service (USFWS). 2020. Lower Snake River Compensation Plan: Fiscal Year 2018 Report. U.S. Fish and Wildlife Service, Lower Snake River Compensation Plan Office. https://www.fws.gov/sites/default/files/documents/2018%20LSRCP%20Annual%20Report.pdf

6 Appendix A. Monthly Production Strategy – McCall Fish Hatchery

6.1.1 January

Incubation

MT

Indoor Vats – 14 vats (20x4x2') at 38.5 F

75,000 @ 1200 fpp and DI = 0.3 Johnson Cr	75,000 @ 1200 fpp and DI = 0.3 Johnson Cr
75,000 @ 1200 fpp and DI = 0.3 Integrated	75,000 @ 1200 fpp and DI = 0..3 Integrated
100,000 @ 1200 fpp and DI = 0.4	100,000 @ 1200 fpp and DI = 0.4
100,000 @ 1200 fpp and DI = 0.4	100,000 @ 1200 fpp and DI = 0.4
100,000 @ 1200 fpp and DI = 0.4	100,000 @ 1200 fpp and DI = 0.4
100,000 @ 1200 fpp and DI = 0.4	100,000 @ 1200 fpp and DI = 0.4
100,000 @ 1200 fpp and DI = 0.4	100,000 @ 1200 fpp and DI = 0.4

Outdoor Rearing – 2 Ponds (196x50x4') at 38.5 F

<table>
<tr><td>512,500 @ 21 fpp and DI = 0.1</td><td rowspan="2">150,000 @ 25 fpp and DI = 0.17

Collection Basin (101x15x4')</td></tr>
<tr><td>512,500 @ 21 fpp and DI = 0.1</td></tr>
</table>

6.1.2 February

Incubation

MT

Indoor Vats – 14 vats (20x4x2') at 38.6 F

75000 @ 800 fpp and DI = 0.52	75000 @ 800 fpp and DI = 0.52
75000 @ 800 fpp and DI = 0.52	75000 @ 800 fpp and DI = 0.52
100000 @ 960 fpp and DI = 0.59	100000 @ 960 fpp and DI = 0.59
100000 @ 960 fpp and DI = 0.59	100000 @ 960 fpp and DI = 0.59
100000 @ 960 fpp and DI = 0.59	100000 @ 960 fpp and DI = 0.59
100000 @ 960 fpp and DI = 0.59	100000 @ 960 fpp and DI = 0.59

Outdoor Rearing – 2 Ponds (196x50x4') at 38.6 F

512,500 @ 20 fpp and DI = 0.18	150,000 @ 25 fpp and DI = 0.17 Collection Basin (101x15x4')
512,500 @ 21 fpp and DI = 0.18	

6.1.3 March

Incubation

MT

Indoor Vats – 14 vats (40x4x2') 2030 gpm at 38.7 F

75,000 @ 480 fpp and DI = 0.32	75,000 @ 480 fpp and DI = 0.32
75,000 @ 480 fpp and DI = 0.32	75,000 @ 480 fpp and DI = 0.32
100,00 @ 630 fpp and DI = 0.44	100,00 @ 630 fpp and DI = 0.44
100,00 @ 630 fpp and DI = 0.44	100,00 @ 630 fpp and DI = 0.44
100,00 @ 630 fpp and DI = 0.44	100,00 @ 630 fpp and DI = 0.44
100,00 @ 630 fpp and DI = 0.44	100,00 @ 630 fpp and DI = 0.44

Outdoor Rearing – 2 Ponds (196x50x4') 4998 gpm at 38.7 F

512,500 @ 20 fpp and DI = 0.20	150,000 @ 24 fpp and DI = 0.18 Collection Basin (101x15x4')
512,500 @ 20 fpp and DI = 0.20	

6.1.4 April

Incubation

MT

Indoor Vats – 14 vats (40x4x2') 2016 gpm at 39.1 F

75,000 @ 350 fpp and DI = .35	75,000 @ 350 fpp and DI = .35
75,000 @ 350 fpp and DI = .35	75,000 @ 350 fpp and DI = .35
100,000 @ 350 fpp and DI = .49	100,000 @ 350 fpp and DI = .49
100,000 @ 350 fpp and DI = .49	100,000 @ 350 fpp and DI = .49
100,000 @ 350 fpp and DI = .49	100,000 @ 350 fpp and DI = .49
100,000 @ 350 fpp and DI = .49	100,000 @ 350 fpp and DI = .49
100,000 @ 350 fpp and DI = .49	100,000 @ 350 fpp and DI = .49

Outdoor Rearing – 2 Ponds (196x50x4')

MT	MT
MT	

6.1.5 May

Incubation

MT

Indoor Vats – 14 vats (40x4x2') 2086 gpm at 43.6 F

75,000 @ 200 fpp and DI = 0.5	75,000 @ 200 fpp and DI = 0.5
75,000 @ 200 fpp and DI = 0.5	75,000 @ 200 fpp and DI = 0.5
100,00 @ 200 fpp and DI = 0.8	100,00 @ 200 fpp and DI = 0.8
100,00 @ 200 fpp and DI = 0.8	100,00 @ 200 fpp and DI = 0.8
100,00 @ 200 fpp and DI = 0.8	100,00 @ 200 fpp and DI = 0.8
100,00 @ 200 fpp and DI = 0.8	100,00 @ 200 fpp and DI = 0.8
100,00 @ 200 fpp and DI = 0.8	100,00 @ 200 fpp and DI = 0.8

Outdoor Rearing – 2 Ponds (196x50x4')

MT	20K RBT
MT	

6.1.6 June

Incubation

<4 Stacks HML Eggs

Indoor Vats – 14 vats (40x4x2') 3360 gpm at 51.2 F

50,000 @ 115 fpp and DI = 0.5	50,000 @ 115 fpp and DI = 0.5
50,000 @ 115 fpp and DI = 0.5	50,000 @ 115 fpp and DI = 0.5
50,000 @ 115 fpp and DI = 0.5	50,000 @ 115 fpp and DI = 0.5
62,500 @ 115 fpp and DI = .45	62,500 @ 115 fpp and DI = .45
62,500 @ 115 fpp and DI = .45	62,500 @ 115 fpp and DI = .45
62,500 @ 115 fpp and DI = .45	62,500 @ 115 fpp and DI = .45
62,500 @ 115 fpp and DI = .45	62,500 @ 115 fpp and DI = .45

Outdoor Rearing – 2 Ponds (196x50x4')

500K SFSR AD Only, DI =.17	20K RBT
MT	

6.1.7 July

Incubation

HML Eggs/fry

Indoor Vats – 14 vats (40x4x2') 600 gpm at 53.1 F

37,500 @ 72 fpp and DI = 0.3	37,500 @ 72 fpp and DI = 0.3
37,500 @ 72 fpp and DI = 0.3	37,500 @ 72 fpp and DI = 0.3
100K HML Trout Fry	
100K HML Trout Fry	

Outdoor Rearing – 2 Ponds (196x50x4') 8010 gpm at 53.1 F

500,000 @ 65 fpp and DI = 0.1	20-30K RBT
500,000 @ 65 fpp and DI = 0.1	

6.1.8 August

Incubation

MT

Indoor Vats – 14 vats (40x4x2') 600 gpm at 53.1 F

37,500 @ 55 fpp and DI = 0.55	37,500 @ 55 fpp and DI = 0.55
37,500 @ 55 fpp and DI = 0.55	37,500 @ 55 fpp and DI = 0.55
100K HML Trout Fry	
100K HML Trout Fry	

Outdoor Rearing – 2 Ponds (196x50x4') 8010 gpm at 53.1 F

500,000 @ 44 fpp and DI = 0.1	20K RBT
500,000 @ 44 fpp and DI = 0.1	

6.1.9 September

Incubation – 26 half-stacks (8) at 2 females/tray

1,800,000 eggs @ 52.0 F

Indoor Vats – 14 vats (40x4x2')

37,500 @ 37 fpp and DI = 0.60	37,500 @ 37 fpp and DI = 0.60
37,500 @ 37 fpp and DI = 0.60	37,500 @ 37 fpp and DI = 0.60
100K HML Trout Fry	
100K HML Trout Fry	

Outdoor Rearing – 2 Ponds (196x50x4') 6562 gpm at 45.4 F

500,000 @ 36 fpp and DI = 0.1	MT **Collection Basin (101x15x4')**
500,000 @ 36 fpp and DI = 0.1	

6.1.10 October

Incubation -- 26 half-stacks (8) at 2 females/tray

1,800,000 eggs @ 48.1 F **300K Eyed Eggs to SBT**

Indoor Vats – 14 vats (40x4x2')

MT	

Outdoor Rearing – 2 Ponds (196x50x4') 6562 gpm at 48.1 F

500,000 @ 27 fpp and DI = 0.16	150,000 @ 30 fpp and DI = 0.16 **Collection Basin (101x15x4')**
500,000 @ 27 fpp and DI = 0.16	

6.1.11 November

Incubation -- 26 half-stacks (8) at 2 females/tray

1,500,000 sac fry @ 45.5 F

Indoor Vats – 14 vats (40x4x2')

MT	

Outdoor Rearing – 2 Ponds (196x50x4') 6562 gpm at 45.5 F

500,000 @ 25 fpp and DI = 0.19	150,000 @ 31 fpp and DI = 0.16 **Collection Basin (101x15x4')**
500,000 @ 25 fpp and DI = 0.19	

6.1.12 December

Incubation -- 26 half-stacks (8) at 2 females/tray

1,500,000 eggs @ 38 F **Start Ponding**

Indoor Vats – 14 vats (20x4x2')

Start Ponding	

Outdoor Rearing – 2 Ponds (196x50x4') 4998 gpm at 40.9 F

500,000 @ 23 fpp and DI = 0.2	150,000 @ 28 fpp and DI = 0.17 **Collection Basin (101x15x4')**
500,000 @ 23 fpp and DI = 0.2	

7 Appendix B. Proposed Adult Holding Ponds