2021 Annual Fishways Status Report

John Day Dam Project

BPA Line Repair

Scott Fielding, Eric Grosvenor, Michael Lotspeich,
and Laura Ricketts

U.S Army Corps of Engineers
John Day Lock & Dam
Rufus, OR 97050
(541) 506-7861

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Introduction

The John Day Dam is located at river mile 216 on the Columbia River and is the third dam upstream from the mouth of the Columbia. The project includes a powerhouse with 16 turbines and 4 skeleton bays (to house additional turbines), a spillway with 20 spill bays (includes 2 top spillway weirs [TSW] located in spill bays 18 and 19), a navigation lock, two fish ladders for upstream migration [North Fish Ladder (NFL), and South Fish Ladder (SFL)], and a complete juvenile bypass system (JBS) with a smolt monitoring facility (SMF) and lab (see figure 1). This document summarizes all fish related activities at John Day Dam in 2021, and all operations were conducted following protocols outlined in the current Fish Passage Plan (see table 1).

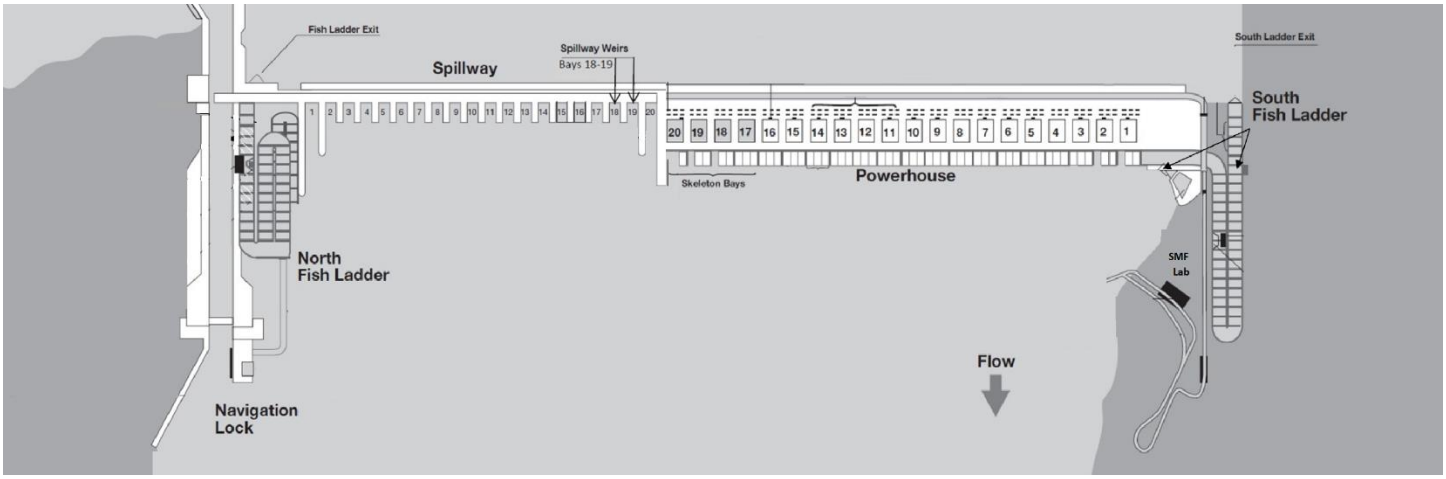


Figure 1: An illustration of the John Day project highlighting the location of several fish passage structures.

2021 JOHN DAY FISHWAYS' OPERATING SCHEDULE	
NORTH ADULT FISHWAY	
Regular Operation W/ AWS	January 23rd – December 7th
AWS Off Half Day for ROV Inspection	August 12th
On Orifice Flow - No AWS Operation	November 29th - December 6th
Dewatered for Maintenance	December 7th - December 31st
SOUTH ADULT FISHWAY	
Regular Operation With AWS	[January 1st - January 23rd] & [February 28th - December 31st]
AWS Off Half Day for ROV Inspection	August 12th
Dewatered for Maintenance	January 24th - February 28th
SMOLT MONITORING FACILITY	
Dewatered for Maintenance	[January 1st - March 23rd] & [December 1st - December 31st]
COVID Sampling (Every Other Day 7AM-1PM)	April 1st - July 29th
Limited Sampling (Water Temperature > 70F°)	July 30th - September 15th
Bypass for PIT Detections	September 16th - November 29th
JUVENILE BYPASS SYSTEM	
Normal Operation with STSs Deployed	[March 1st - March 31st units 1-4] & [April 1st - December 15th all units]
SPILLWAY WITH 2 TSWs (at bay 18 &19)	
On Seal	[January 1st - April 9th] & [December 1st - December 31st]
Fish Spill Per FPP Schedule	April 10th - August 31st
1.6 KCFS, Bay 2 Only (for NFL Attraction)	September 1st - November 30th
Early TSW Spill (Due to High Flows)	N/A

Table 1: This Table highlights key fishway operations at the John Day project in accordance with the Fish Passage Plan.

Fishway Inspection Procedures

The John Day project (JDA) adult fishways, and Juvenile Bypass System (JBS) were inspected twice daily during the adult fish passage season (April 1st - November 30th), and once per day during the winter maintenance season [(January 1st - February 28th) & (December 1st- December 31st)]. The JDA Smolt Monitoring Facility (SMF) inspections were conducted bihourly throughout the juvenile sampling season (April 1st - Sept 15th). Any out of criteria (OOC) observations were reported in the weekly status reports (see table 2).

	2016		2017		2018		2019		2020		2021	
	Total #	% OOC	Total #	% OOC	Total #	% OOC	Total #	% OOC	Total #	% OOC	Total #	% OOC
Number of Inspections	641		640		639		618		633		629	
	NORTH FISHWAY											
Exit Differential	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Exit regulating weirs position	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Count station differential	0	0.0%	2	0.3%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Weir crest depth	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Entrance differential	0	0.0%	0	0.0%	0	0.0%	2	0.3%	2	0.30%	2	0.3%
	SOUTH FISHWAY											
Exit differential	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Exit regulating weirs position	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Count station differential	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Weir crest depth	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
South entrance differential	12	1.9%	6	0.9%	1	0.2%	5	0.8%	1	0.20%	2	0.3%
Entrance weir SE-1	7	1.1%	4	0.6%	3	0.5%	38	6.1%	8	1.30%	2	0.3%
Collection channel velocity	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Bay 1 differential	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
N. Entrance PH (Bay 19) differential	2	0.3%	3	0.5%	1	0.2%	12	1.9%	0	0.00%	3	0.5%
Entrance weir NE-1	9	1.4%	0	0.0%	2	0.3%	31	5.0%	4	0.60%	3	0.5%
Entrance weir NE-2	5	0.8%	0	0.0%	2	0.3%	9	1.5%	5	0.80%	2	0.3%
	JUVENILE PASSAGE											
Forebay/bypass conduit differential	0	0.0%	10	1.6%	0	0.0%	0	0.0%	6	0.90%	1	0.2%
Submersible traveling screens	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Turbine trash rack drawdown	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Vertical barrier screen drawdown	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Spill volume	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Spill pattern	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%
Turbine unit priority	0	0.0%	0	0.0%	7	1.1%	0	0.0%	0	0.00%	72	11.4%
Turbine 1% efficiency	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.00%	0	0.0%

Table 2: John Day fishways and the number/percentage of out of criteria (OOC) observations (2016-2021). There were numerous days when the turbine unit priority was out of criteria. This was due to the line 1-outage that took place October 19th, 2021 – December 16th, 2021.

Fish Salvage Procedures

Fishway Dewatering Procedures

Fishways are dewatered following standard operating procedures (SOPs). When fishways are dewatered, fisheries personnel enter and salvage stranded fish. Salvaged fish are transported to either the forebay or tailrace (depending on circumstances such as: fish species, dewatering location, age-class, or stress levels). Efforts are made to reduce stress by providing a continual water supply and following minimal fish handling procedures. Follow-up inspections are performed to account for any overlooked fish. There were no known mortalities in 2021 (See Table 3).

Turbine Dewatering Procedures

When following operational guidelines, turbine dewaterings require minimal fish salvage. If a turbine fails, the operational guidelines cannot always be followed and may result in fish entrainment. Procedures are continually evaluated to determine the best methods to minimize fish stress and mortality. Prior to fish salvage all necessary equipment is staged (including transport tanks). Typically, fish are transported via fish bag. Transport tanks are only used if fish numbers are higher than the two bags can safely handle (tanked fish are released via crane). Additionally, JDA has a trailer mounted fish tank. This tank is primarily used to transport high volumes of lampreys (when applicable), making it easy to release lampreys well upstream of the dam (release site is approximately 2RM upstream), helping reduce fallback (See Table 3).

2021 John Day Fish Salvage Report

Key; adult=a, juvenile=j, carp=cp, catfish=ct, sculpin=sp, small mouth bass=smb, crappie=cr, whitefish=wf, perch=pr, bluegill=bg, walleye=we, Sturgeon=st, shad-sh, Chinook-Ch, steelhead-STH, coho-co, sockeye-so, lamprey-la Released In Good Conditon=RIGC

Date	Event	CH	STH	SO	CO	LA	Shad	Other	Comments	Mort	Cause
1/19	SFL-Upper Dewater	2a	2a	0	0	0	2	0	RIGC into TW	0	N/A
1/26	MU16 SC	0	0	0	0	0	0	1	1 ct	0	N/A
1/27	MU16 DT	0	0	0	0	0	0	0		0	N/A
2/3	JBS - Upper	0	0	0	0	0	0	4	4-sp	0	N/A
2/3	JBS - Lower	0	0	0	0	0	0	0		0	N/A
3/8	Nav Lock	0	0	0	0	0	0	0	1 smb 1 wal	0	N/A
3/18	MU7 SC	0	0	0	0	0	0	0		0	N/A
4/20	SFL-Debris removal	1a	0	0	0	0	0	9	5 smb, 4 sucker RIGC into TW	0	N/A
5/18	MU8 SC	0	0	0	0	0	0	0		0	N/A
9/15	MU-14 SC	0	0	0	0	0	0	3	3-ct	0	N/A
9/16	MU-14 DT	0	0	0	0	0	0	0		0	N/A
10/21	MU-1 SC	0	0	0	0	0	0	0	0	0	N/A
10/21	MU-1 DT	0	0	0	0	0	0	0	0	0	N/A
12/1	SMF Dewater	20a	5a	0	0	38	1a	39	20-ct, 10-we, 5-smb, 4-st (~24-36")	0	N/A
12/6	NFL Upper Dewater	0	2a	0	0	1a	9a	2	2-st (~48", 60"), 2-STH, 1-la	0	N/A

Table 3: Results from fish salvage operations at the John Day project in 2021.

Fish Counting

JDA fish counting (visual and/or video) occurred April 1st – October 31st during the 2021 adult fish passage season, and all fish count data was posted to an online database. Fish counts were conducted at both the north fish ladder (NFL) and south fish ladder (SFL). Fish counts were conducted, under contract, by Four Peaks Environmental Science & Data Solutions.

FISH COUNTING SCHEDULE
April 1st – October 31st visual daily counts (0500 - 2100 PST)
June 15th – September 30th nighttime video counts (2000 - 0400 PST)

Improvements were made to the NFL entrance between 2010 and 2012 to help improve fish ladder passage for salmonids and lamprey. In 2021 the total salmonid counts ranged from 11-25% at the NFL vs. 75-89% at the SFL (see figure 2) and the 10-year averages (see figure 3) at the NFL ranged from 22-44% vs. 56-78% for the SFL. Salmonids are consistently counted more at the SFL vs the NFL. Sockeyes appear to be the exception. Most years sockeye preferred the SFL, however there were years with slightly higher counts at the NFL (2014 and 2016). Conversely lampreys appear to prefer the NFL over the SFL. However, in 2021 only 46% of the lamprey counts occurred at the NFL. This is the only occurrence over the past 10-years where more lamprey counts were observed at the SFL.

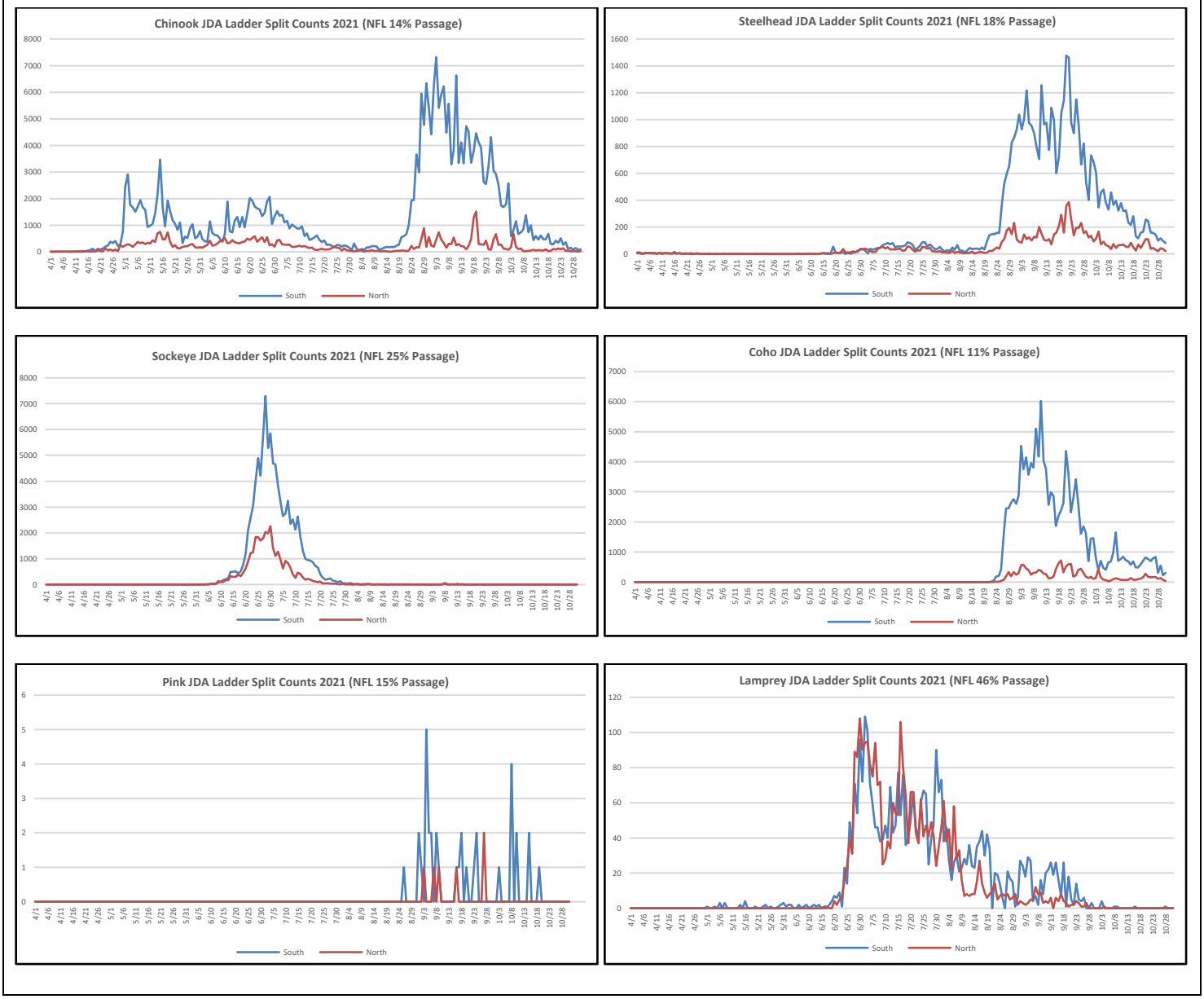


Figure 2: Graphs comparing adult fish counts between fish ladders (north and south), for 6-different fish species (Chinook, steelhead, sockeye, coho, pink, and lamprey), at the John Day project during the 2021 adult fish count season.

Figure 3: Total fish ladder counts (north and south combined) over a 10-year span (2012-2021) for 5-different fish species (Chinook, steelhead, sockeye, coho, and lamprey), and the percentage that use the north fish ladder at John Day Dam.

Lamprey Collection

JDA has the ability to collect lampreys from both fish ladders (north and south). The two systems collect fish differently, and collection efficiency varies. The north fish ladder (NFL) has a ramp system that utilizes pumped water to attract lampreys. When lampreys climb the ramp, they drop into a holding tank. This NFL system is primarily accessed by elevator (when operational).

The south fish ladder (SFL) utilizes a trap system. Lampreys navigate the ladder and enter the trap near the counting station. Once there, they swim under grating and are guided into a trap box. This box is lifted by a fixed jib crane for collection. An elevator is not required to access the SFL system.

North Fish Ladder (NFL) Lamprey Passage System (LPS)

The NFL LPS is located at the NFL entrance. When lamprey enter the ladder, they navigate a bollard field. This field is used to break up velocity and makes ladder entrance easier. On the north side of the NFL entrance is a ramp fed by pumped water. Lampreys must climb this ramp to reach the holding tank. A rest box is located halfway up the ramp (the box can be flushed pneumatically as needed) to give lampreys a chance to recover during their journey. Once lampreys climb the ramp, they enter an upwelling box. This is where pumped water enters the system. The water percolates through porosity plating, and either down the

ramp (for attraction) or into the holding tank (to circulate water in the holding tank). The lampreys travel through the upwelling box, however, porosity plating only allows access the upper portion of the box. Once lampreys navigate the upwelling box, they drop into the holding tank via irrigation piping. This is where personnel recover the lampreys (see figure 4)

Note The only methods to transport collected lampreys are by stairs, elevator, or winch. It is 100-foot climb to the intake deck (access area). It is difficult on personnel, and fish to transport them by stairs. The elevator is outdated, and unreliable. A winch system was created for backup, but it has not been tested. Access is the most limiting factor for this system.

Figure 4: Images of the north fish ladder (NFL) lamprey passage system (LPS) (*Note* the first picture is facing east, and the second picture is facing west): (A) bollard field (B) access ramp (C) resting box (D) ramp entering the upwelling box (E) upwelling box (F) holding tank (G) lamprey pumps (H)water supply line (I) pump location from the 2019 modification (J) pneumatic airlines to flush the rest box.

South Fish Ladder (SFL) Lamprey Trapping System (LTS)

The SFL LTS is located near the SFL count station. Lampreys approach this area and enter the system below a grating structure on the deck. Once inside, they travel into a conduit which leads them up a small ramp, and into a trap box. This trap box can then be lifted, by a fixed jib crane, allowing personnel to collect the lampreys (see figure 5). This system generally operates flawlessly, however success is variable. One issue with this area is that lampreys tend to mill in the conduit/ramp area. The flows appear to be ideal in this area, and they may reside there for long periods of time (actual residing times unknown). Every year, during winter maintenance, several lampreys are observed exiting the conduit/ramp area [(2015: 75), (2016: 101), (2017: 180), (2018: 26), (2019: 12)].

Figure 5: Images of the south fish ladder (SFL) lamprey trap system (LTS): (A) entrance (B) diversion conduit (C) count station window/crowder (D) trap box guide (E) trap box (with access hatch removed) (F) lamprey entrance port (G) trap hoisting jib crane. *Note* when in operation picketed leads rest atop the LTS entrance (A), and upriver from the trap box guide (D). These picketed leads guide fish to the count station window (D).

Collected Lamprey Data

Adult lamprey collections were conducted at JDA from July 2nd through September 9th during the 2021 passage season. The Columbia River Inter-Tribal Fish Commission (CRITFC) operated all traps and collected the lampreys. Collected lampreys were

translocated in accordance with the Tribal Pacific Lamprey Restoration Plan (TPLRP). In addition to the NFL LPS and SFL LTS, CRITFC utilized four PVC tube traps near the NFL count station (between the picketed leads). Lamprey collection efficiency varies annually.

JDA Lamprey Collection Data [2016-2021]						
	2016	**2017**	**2018**	**2019**	**2020**	**2021**
Total SFL Counts	4229	11615	4200	1799	1109	3319
Total NFL Counts	5540	11789	4342	2790	1932	2869
SFL Trap	467	125	325	272	140	533
NFL LPS	346	419	1873	3	162	42
NFL PVC Trap #1	-	-	-	33	70	152
NFL PVC Trap #2	-	-	-	0	60	3
NFL PVC Trap #3	-	-	-	183	2	23
NFL PVC Trap #4	-	-	-	-	-	13
Not Specified	205	227	-	-	-	-
Total Handled	**1018**	**771**	**2198**	**491**	**434**	**766**

Table 4: Lamprey collection at John Day Dam (2016 – 2021), for each trapping location, and total ladder counts.

Northern Pikeminnow Dam Angling

The 2021 JDA northern pikeminnow (NPM) angling season took place May 3rd through October 10th. Angling occurred at the JDA tailrace (powerhouse section) and was performed by a Washington Department of Fish and Wildlife (WDFW) crew.

Since 2016 the NPM catch per effort-hour (NPM/H) has decreased annually at JDA (see table 5). In 2021 the average was 1.6 NPM/H, a decrease of 42% from 2016 (3.8 NPM/H). Currently, gut content and data analysis is limited by COVID-19 restrictions. No gut analyses were taken during the 2021 NPMP angling season.

Northern Pikeminnow Catches at JDA (2016 - 2021)			
	Total NPM	**Effort (Hours)**	**NPM/Hour**
2016	3,002	787.25	3.8
2017	3,472	1042.5	3.3
2018	3,089	1199.25	2.6
2019	1,894	760.5	2.5
2020	1,782	743.75	2.4
2021	1,269	785.25	1.6
Average	**2418**	**886.42**	**2.7**

Table 5: Northern Pikeminnow (NPM) catches at JDA (2016-2021), and NPM caught/hour

Avian Predator Abatement

Bypassing smolts through spill and TSWs has been a critical part of JDA fish passage operations since 2006. Unfortunately, piscivorous bird predation on smolts in the tailrace's Boat Restricted Zone (BRZ) has increased during this time. In response, a comprehensive grid of 125 avian lines was installed above the tailrace BRZ in 2010 (see figure 6). The avian lines wore out quicker than expected, and before replacement (in April 2018) 29-lines were missing (23% of the grid). The grid was upgraded from Plasma lines to Vectran™ lines to reduce breakage. The improved grid has held up well, however one avian line (#68 in the spillway) rubbed on a tree branch and snapped on September 15, 2020. John Day mechanical crew immediately spotted and removed the broken line without incident. John Day fisheries continues to monitor trees in the area. Tree branches near the lines were trimmed and none snapped in the 2021 season due to trees. However, 7 lines were knocked down by contractors conducting the line repair this season. On September 23, 2021 1 line was knocked down (# 92 in the Powerhouse section) and on October 7, 2021 6 lines were knocked down (#98-103 in the Powerhouse section). The contractor will be replacing the broken avian lines; the repair date is to be determined.

In addition to avian lines, supplemental boat hazing (for gulls and cormorants only) by the U.S. Department of Agriculture (USDA) has occurred annually since 2010 (April 16th – July 31st). Hazing occurred 8 hours per day, 7 days a week, with the start and end times of shifts varying to help keep birds from becoming habituated. The hazing is primarily boat based using various pyrotechnics (15mm banger and screamer variants and 15mm extended range rockets) however, if river conditions are deemed to be unsafe then hazing is moved to the tailrace deck. The 125 avian line grid, combined with the USDA boat hazing, has effectively reduced gull predation at JDA.

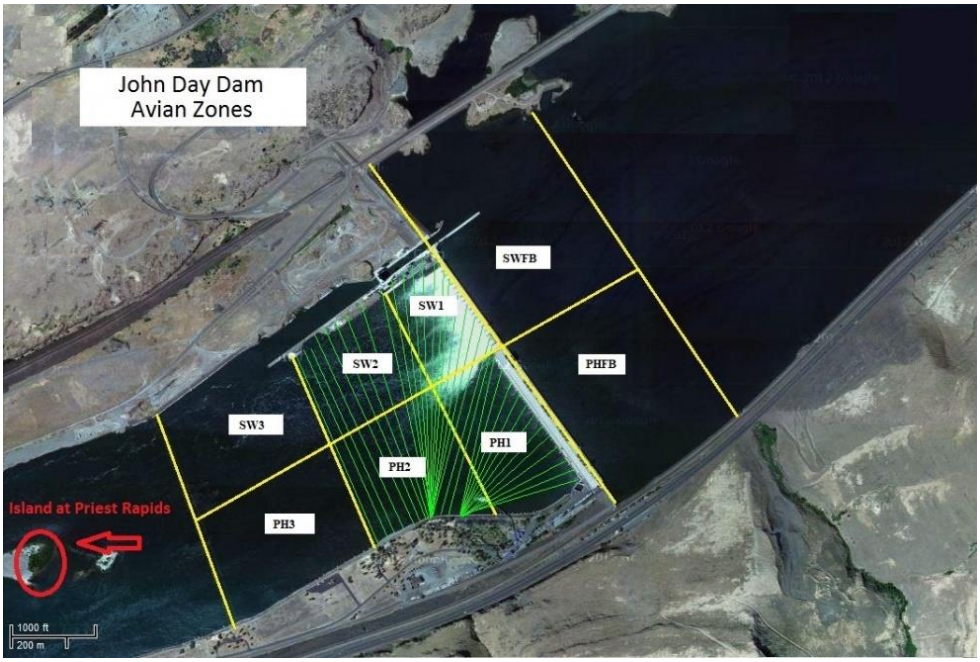
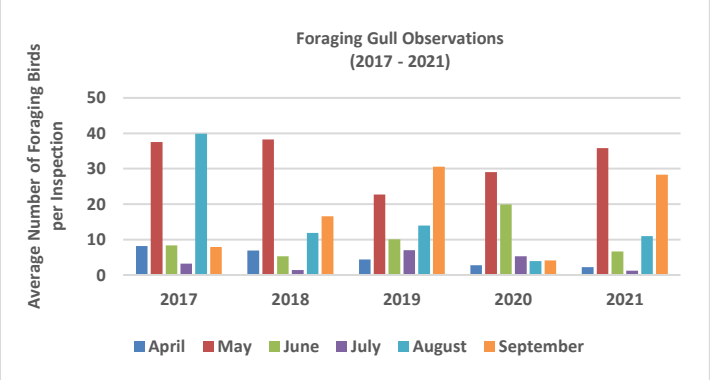


Figure 6: An overview of the avian line grid at the JDA tailrace BRZ [powerhouse forebay=PHFB, spillway forebay=SWFB, spillway tailrace zones 1-3 (SWT1-SWT3), powerhouse tailrace zones 1-3 (PHT1-PHT3)]. Red circle indicates Preacher's Island, where American white pelicans loaf between feedings.

Avian Predation

Bird counts are conducted year-round with two counts daily March 1 – November 30, and 1 count per day December 1 – February 28. Birds are counted from end of the tailrace deck, the southwest corner of the navlock, and the intake deck, depending on which zones are being counted and the best location for visibility that day. Time of day for the counts varies day to day, with one in the morning and one in the afternoon when two counts are conducted per day, and as time allows when counting once a day in the winter. Counts are conducted using Vulture HD 15x56 binoculars or the naked eye depending on the location. The three main piscivorous birds observed at JDA are gulls (predominantly California and Ring-Billed), American White Pelicans (AWPE) and Double-Crested Cormorants (DCCO), with gulls being the main focus, as they are the largest known piscivorous threat to listed fish at JDA. Western Grebes are also present in the PHFB section for most of the smolt outmigration and counts are reported in the weekly report. Caspian terns are a rare sight at JDA (Only 2-observations on record: August 14th, 2018 and May 23rd, 2020, both terns were foraging in the forebay, and neither lingered), there were no sightings by JDF in the 2021 season. Other piscivorous birds encountered in small numbers on the project include Bald Eagles (during the winter months), Osprey (mainly April-September), Common Merganser (in the fall) and Great Blue Heron (year-round).

In 2021, gulls arrived in the tailrace to forage in late April and May when outmigrating smolts numbers started to pick up. Gull numbers then decreased in June and July possibly due to the continued presence of the hazers, and/or the influx of American White Pelicans (AWPE) during these months. Gull numbers then increased again in the late summer and fall with end of the hazing season and dispersal of AWPE to feed on the abundance of juvenile shad at that time. Large numbers were seen resting on the wingwall and on the water in SWFB and PHFB throughout the fall and into early winter (see figure 7). Pelican sightings have increased significantly since 2012 and avian lines do not deter them. Additionally, USDA is not permitted to haze pelicans due to their protected status. Pelicans start arriving in small numbers as early as March, however the biggest influx is June – August which corresponds to the adult shad upstream migration (see figure 8). Most pelicans leave the area in late summer/early fall; however, this was the third-year pelicans have overwintered in the area. A couple are seen around the project occasionally and opportunistic sightings occur at the mouth of the Deschutes river when the JDF crew are traveling to and from the project. Despite an influx of pelicans at JDA, predatory impacts on listed fish are not fully known. Cormorants are present for most of the year expect May-July when hazing occurs, and they leave the area during that time. They return to the project in August and remain for the rest of the year with small numbers foraging in the tailrace, but mainly seen exhibiting non foraging behavior on the riprap in zone SW2 or roosting on towers in PHFB (see figure 9). Grebe abundance was mostly confined to zone PHFB and were therefore unaffected by USDA boat hazing. Grebes were seen foraging mainly during the spring and early summer (see figure 10) in zone PHFB. Over the late summer and fall grebe numbers decreased and they were completely dispersed by winter. Figure 11 shows the breakdown of where all the foraging activity occurs by species and zone.



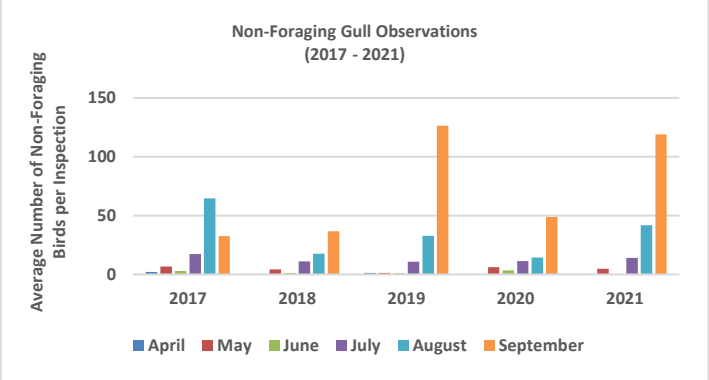
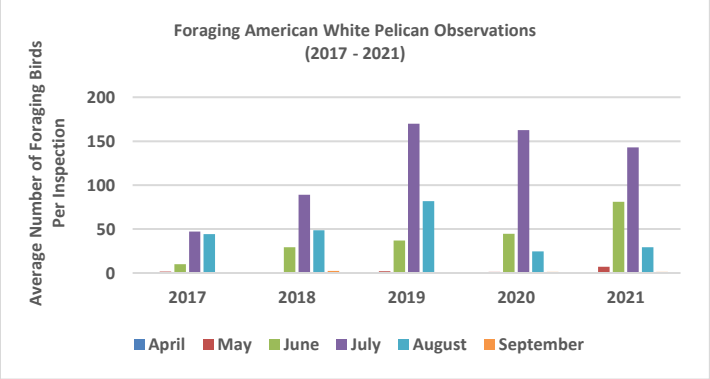


Figure 7: Monthly gull observations shown as average number of birds per inspection (2-inspections daily) over a five-year period (2017-2021). The left graph represents actively foraging gull observations, and the right chart represents non-foraging gull observations. Gulls are present year-round, however April – September correlates with smolt outmigration at JDA.



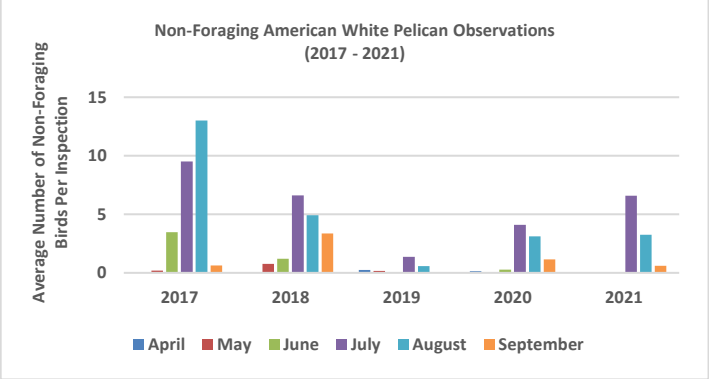


Figure 8: Monthly American white pelican (AWPE) observations shown as average number of birds per inspection (2-inspections daily) over a five-year period (2017-2021). The left graph represents actively foraging AWPE observations, and the right chart represents non-foraging AWPE observations. Pelicans linger in small numbers beyond September (fewer than 10) however, April – September correlates with smolt outmigration at JDA.

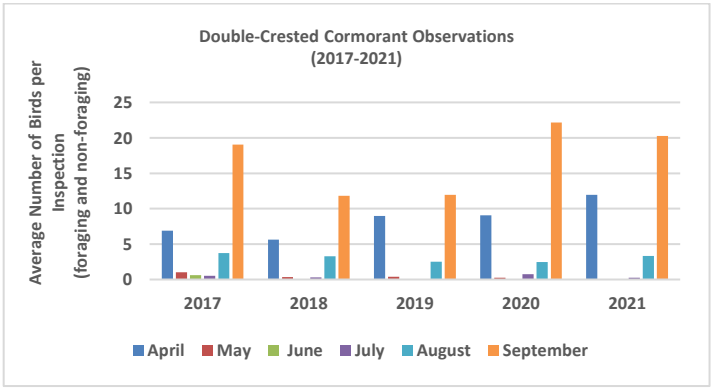


Figure 9: Monthly Double-Crested Cormorant observations shown as average number of birds per inspection (2-inspections daily) over a five-year period (2017-2021).

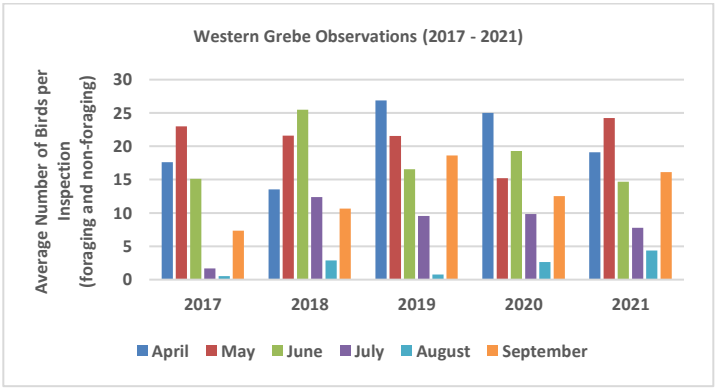


Figure 10: Monthly Grebe observations shown as average number of birds per inspection (2-inspections daily) over a five-year period (2017-2021).

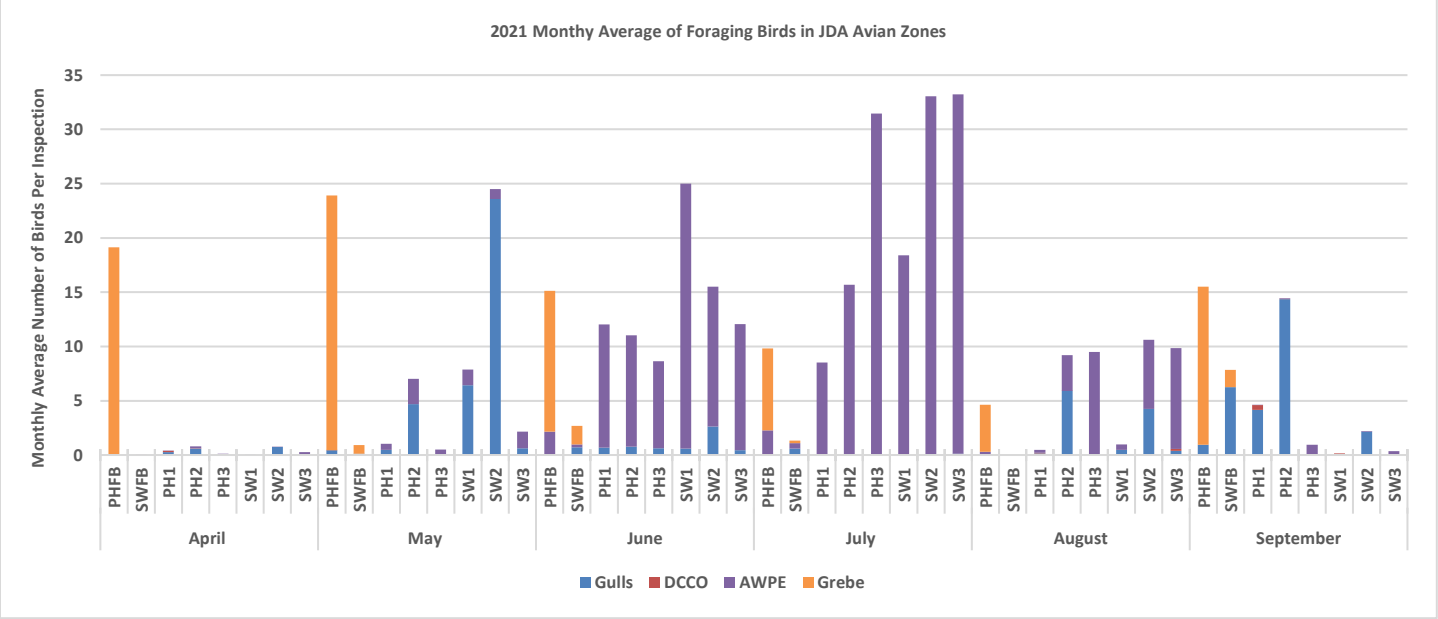


Figure 11: 2021 monthly average of foraging birds broken down into avian zones to better visualize where the main areas of foraging occur.

PIT Tag Detections from Preacher's Island

Preacher's island is a dredged material island located approximately 1 mile downstream of John Day Dam. It is a known loafing spot for American white pelicans (AWPE) and other piscivorous birds such as gulls and double-crested cormorants, however AWPE and gulls are the main avian predators on the island during the smolt outmigration. To help better understand predation rates on smolts, John Day Fisheries (JDF) personnel coordinate yearly PIT tag scans on the island. In total, 854 PIT tags have been recovered on Preacher's Island over the course of 3 years (2019-2021). With a high number of recovered PIT tags, JDF submitted a request to the Columbia Basin PIT Tag Information System (PTAGIS) for the island to become a mark, recovery, recapture (MRR) site. The request was approved, and Preacher's Island (JDPI) was implemented as a MRR site in December 2021. All recovered PIT tags have been uploaded and recorded into PTAGIS.

The third annual island scan was conducted on September 13, 2021 using Biomark HPR Plus readers. The JDF crew scanned the whole island, focusing on areas where birds are known to congregate, and recovered 287 unique PIT tags (see figure 12). Of the 287 unique PIT tags recovered, 168 were Chinook, 99 were Steelhead, 11 were Coho, 6 were Sockeye, 2 were Smallmouth Bass, and 1 was American Shad. The predominate species of all the PIT tags that have been recovered on JDPI is Chinook (58%) followed by Steelhead (33%) (see figure 13).

Figure 12: An image of Preacher's Island with recovered PIT tag coordinate locations from the 2020 and 2021 surveys. Blue - 2021 locations, Pink - 2020 locations

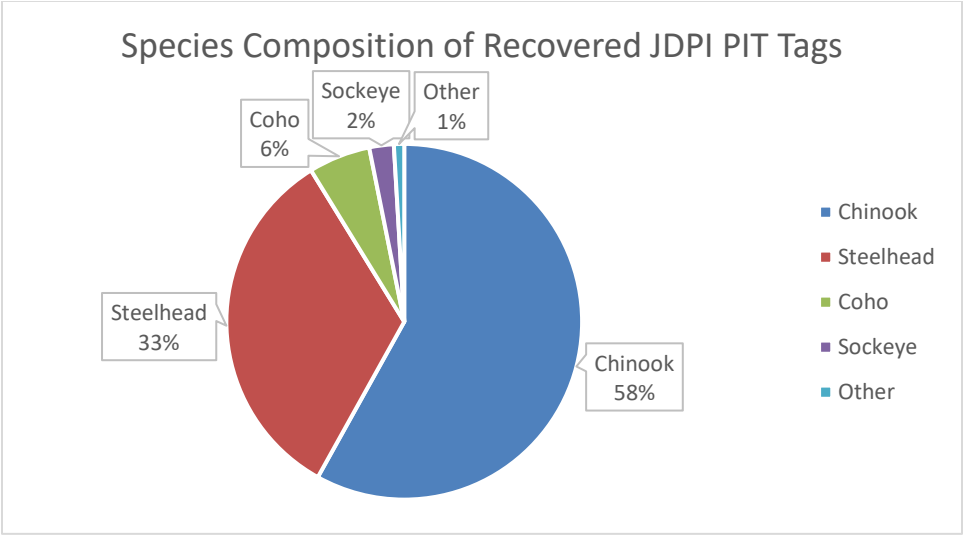


Figure 13: Species composition of all recovered PIT tags from Preacher's Island from all survey years. "Other" category consists of smallmouth bass (3), unknown (2), American shad (1), pacific lamprey (1), and white sturgeon (1).

Water Quality

Forebay Water Temperatures

The JDA forebay water temperatures were obtained from a United States Geological Survey (USGS) temperature sensor (see figure 14). This sensor is located at the upstream end of the navigation lock guide-wall. When JDA forebay water temperatures reach 70°F, JDF switches into 70°F juvenile sampling mode. During this time, condition samples are only taken Mondays and Thursdays, from 7AM – 1PM. This helps reduce stress on outmigrating smolts.

Fish Ladder Water Temperatures

John Day fisheries personnel (JDF) records ladder temperatures at the entrance and exit of both fish ladders (north and south). The exit temperatures are recorded upstream of the diffusers, and just downstream of the control sections (modulating weirs). These temperatures are measured using Hobo® (P/N: U22-001) temperature loggers (see figure 15). The temperatures are offloaded weekly (or as time permits) and sent to the Fish Passage Center (FPC). These temperatures are also graphed and displayed in the weekly status reports (see figure 16).

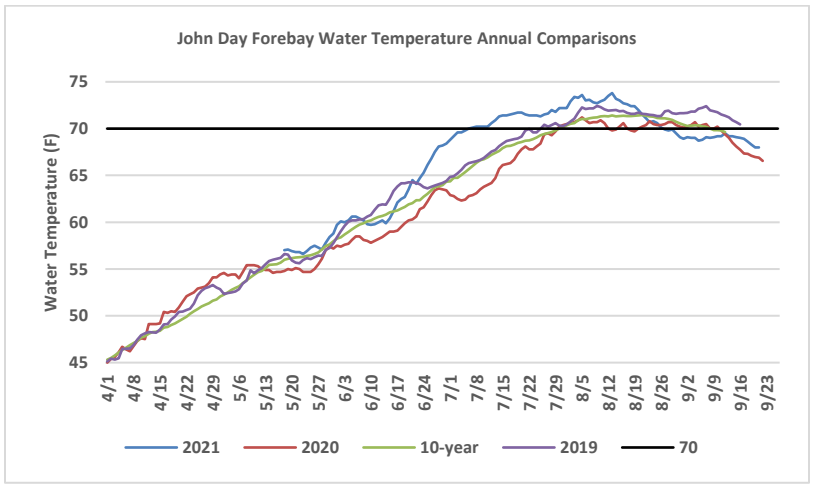


Figure 14: Average daily temperatures at JDA (2019 – 2021) measured by USDA temperature probes compared to the 10-year average. The black line represents the 70-degree threshold for juvenile sampling.

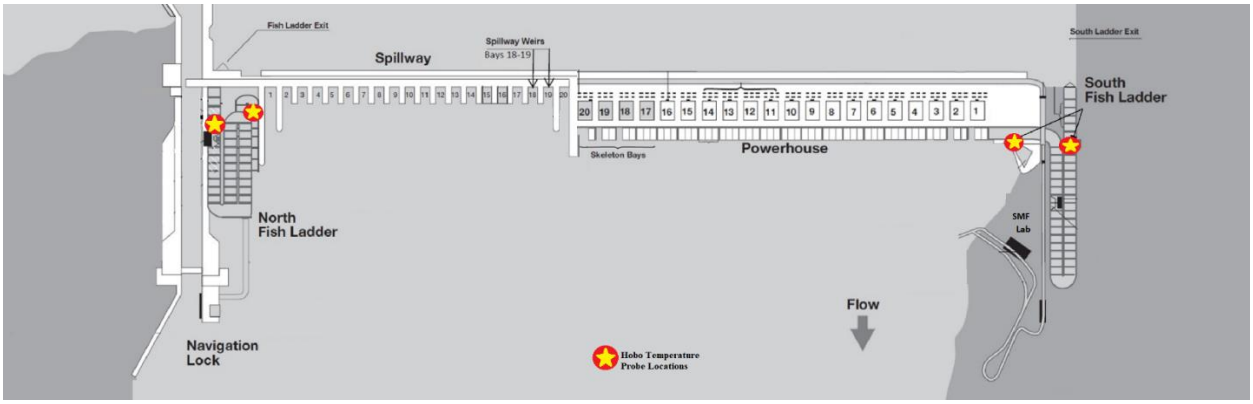
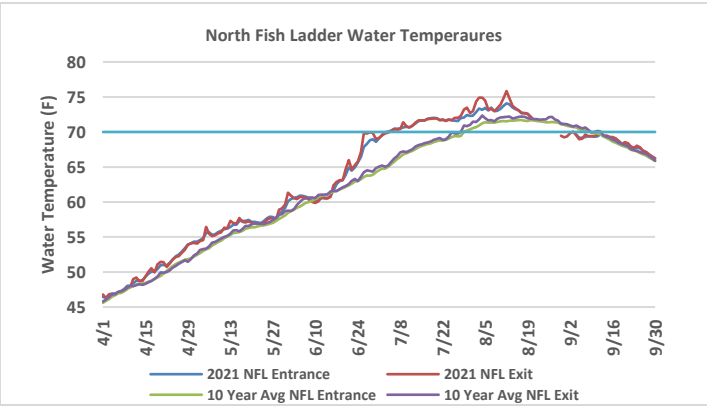


Figure 15: Water temperature probe locations at the John Day Dam project.



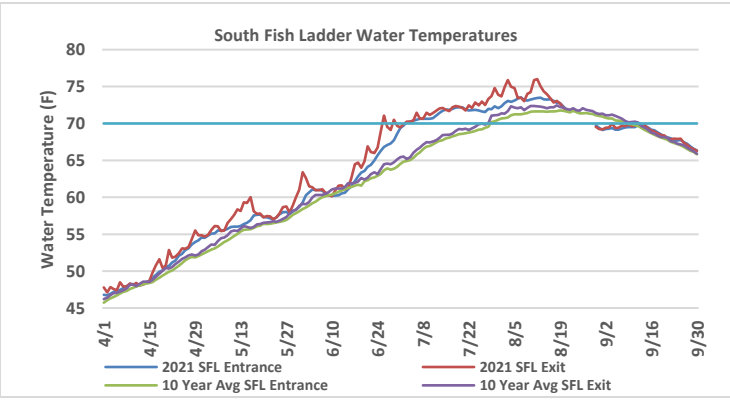


Figure 16: JDA 2021 average daily water temperatures and 10-year averages (2011-2020) for both entrance and exit at each ladder. No ladder temps from 8/22/21-8/30/21 due to shuttle malfunction. No NFL entrance data from 8/30/21-9/4/21 because probe was set to record every second instead of every hour.

Water Clarity

A secchi disk was used to measure water clarity at the JDA north fish ladder (NFL) (just upstream from the count station) (see figure 17). Daily measurements are taken at the NFL (SFL when NFL is out for winter maintenance) for many reasons including ease of access, river conditions, and convenience. Unfortunately, due to water depth, the maximum obtainable measurement is 6-feet. The clarity is typically 6-feet except during the spring freshet when sediment washes out from upstream tributaries. Daily and average-weekly clarity readings are reported in the weekly status reports.

River Flow

Total dissolved gas (TDG) data were obtained from USGS gauges located in the forebay and tailrace (see figure 18). Tailwater TDG was mostly below the 10-year average except for the beginning of June, and peaked on June 6th at 125% saturation, the gas cap set for the year. Spill and flow data were obtained from the Fish Passage Center (FPC) website (see figures 19-21 respectively). 2021 was a low flow year, and the flow was primarily below the 10-year average. It peaked on June 5th at 302.7 kilo cubic feet per second (kcfs), well below last year's peak on June 2nd at 411.13 kcfs. Spill for juvenile fish passage started April 10 and ended on August 31. Attraction spill for adults to the North Fish Ladder continued with spill bay 2 open one stop (1.6 kcfs) through November 30th. Spill (kcfs) was mostly lower than the 10-year average and peaked on June 4th at 154.9 kcfs. However, since this was a low flow year when spill was looked at as percent of river flow, it was well about the 10-year average and peaked at 63.1% on May 7th.

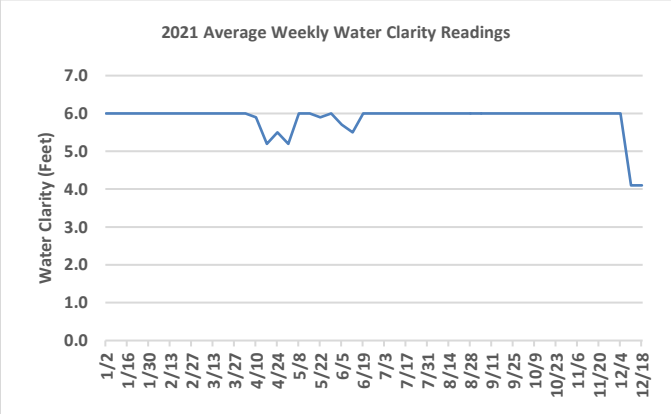


Figure 17: JDA average weekly water clarity.

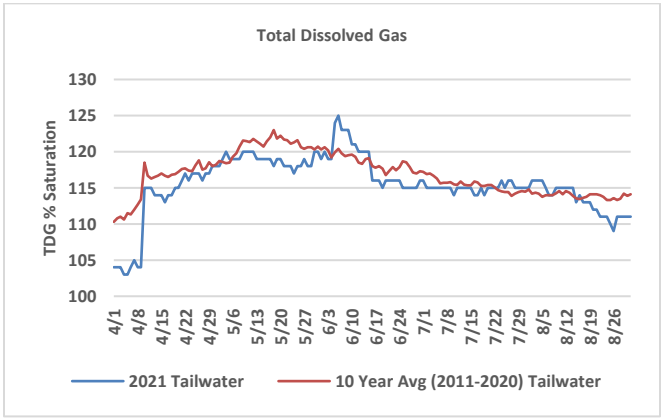


Figure 18: JDA average daily total dissolved gas (TDG) during spill season.

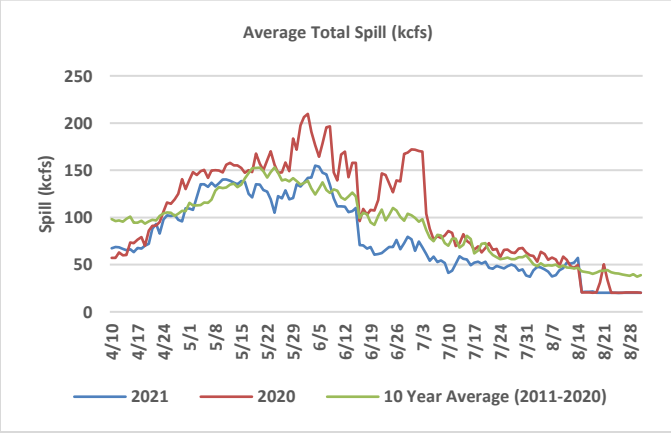


Figure 19: JDA average daily spill (kcfs).

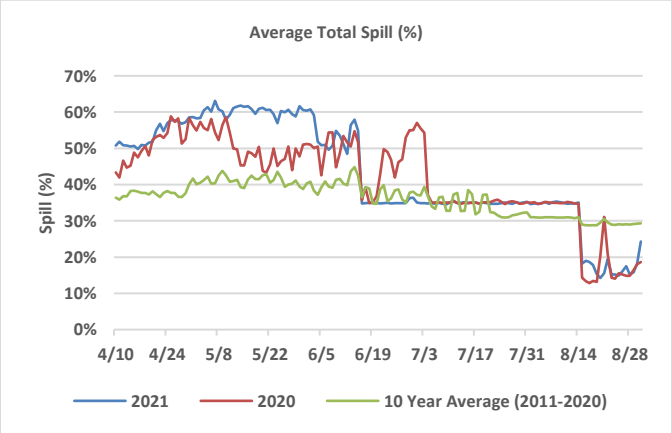


Figure 20: JDA average daily spill (%).

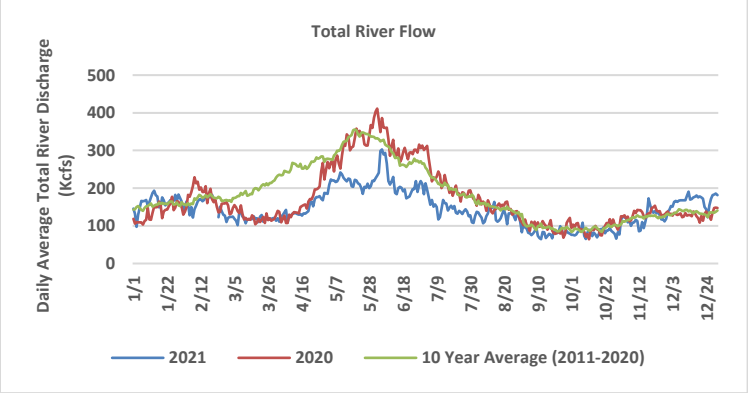


Figure 21: JDA 2021 Total River flow (kcfs).

South Fish Ladder Collection Channel Velocities

JDF monitors water velocities from the SFL collection channel. Historically velocities were calculated by recording the travel time of floats down the length of the collection channel. The times were recorded at every 2nd monolith, and this revealed velocities along the entire channel. On July 7th, 2020 JDF began using a General Oceanics (model: 2030) velocity meter to obtain more accurate readings, (see figure 22) and continued using this velocity meter for 2021. Velocities are measured at 2-different locations, for at least 5-minutes, along the collection channel (Bays 4 & 12) (see figure 23). There were no time guidelines included with the meter, the times were established onsite.

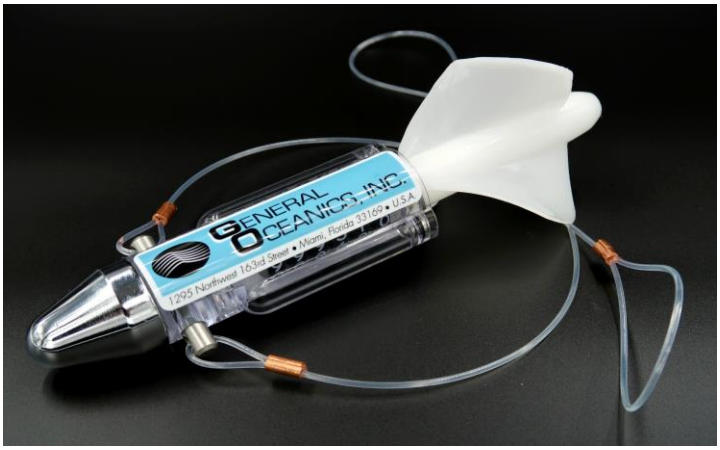


Figure 22: General Oceanics (model: 2030) flow meter used to measure the JDA south fish ladder collection channel velocities

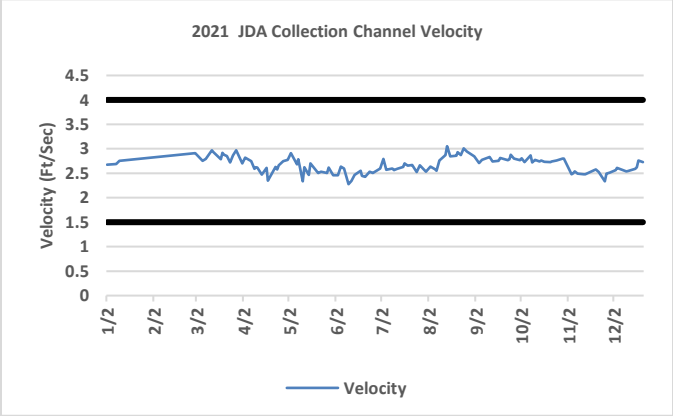


Figure 23: JDA SFL collection channel velocities during the 2021 adult fish passage season (Mar. 1st – Dec. 1st). Dark black lines represent the FPP criteria range of 1.5 - 4.0 feet per second (Ft/Sec)

COVID-19 Impacts

COVID-19 impacted John Day Fisheries during the 2021 fish passage season. COVID protocols again limited the number of staff at the Smolt Monitoring Facility (SMF) and the number of hours sampled during 2021. Condition sampling, every other day sampling from 0700 to 1300, was chosen to reduce the number of staff at the SMF daily. Condition monitoring was also implemented in 2020 to reduce staffing at the SMF to follow state and federal COVID protocols. All other duties associated with the Fish Passage

Plan (daily inspections) continued without interruption during the fish passage season. The 70° sampling procedures were followed in 2021.

Acknowledgements

Kudos to all John Day Maintenance, Operations, Electrical, Natural Resources, Administration and Fisheries personnel for their dedication and hard work on improving fish passage at John Day Dam during this difficult year. A special thank you goes to Michael Lotspeich and Laura Ricketts for putting this report together.

Research

Columbia River Inter-Tribal Fish Commission (CRITFC): Collected adult Pacific lamprey for the Tribal Pacific Lamprey Restoration Plan (TPLRP).

Confederated Tribes and Bands of the Yakama Nation: Collected juvenile Pacific lamprey for acoustic telemetry research.

Four Peaks Environmental Science & Data Solutions: Conducted fish ladder counts for the USACE Adult Fish Counting Program.

Oregon Department of Fish and Wildlife (ODFW): Ongoing BPA funded research associated with the northern pikeminnow (NPM) Management Program. Gut samples and biological data were collected from harvested NPMs for research purposes.

Oregon Department of Fish and Wildlife/ Fish Passage Center (FPC): Performed the monthly Fish Passage Operations and Maintenance (FPOM) directed inspections of all JDA adult and juvenile fishways (see the FPC's annual report.)

Pacific States Marine Fish Commission (PSMFC): Sampled juvenile salmonids, lamprey, and bycatch at the JDA SMF April 1st through September 15th. Additionally, PSMFC collected PIT tag readings from both fish ladders and the full-flow PIT tag detector.

Acronyms

AWPE: American White Pelican
AWS: Auxiliary Water Supply
FPP: Fish Passage Plan
JBS: Juvenile Bypass System
JDA: John Day Project
JDF: John Day Fisheries
LPS: Lamprey Passage System
LTS: Lamprey Trapping System
NFL: North Fish Ladder
OOC: Out of Criteria
SMF: Smolt Monitoring Facility
SCADA: Supervisory Control and Data Acquisition
SFL: South Fish Ladder
DCCO: Double-Crested Cormorant
BRZ: Boat Restricted Zone
TDG: Total Dissolved Gas
KCFS: Kilo Cubic Feet per Second
NPM: Northern Pikeminnow
PIT: Passive Integrated Transponder
TSW: Top Spillway Weir
USDA: United States Department of Agriculture

Approved by Brett Call, John Day/ Willow Creek Operations Manager