2021 ANNUAL FISHWAY STATUS REPORT THE DALLES DAM

January 2022: Bob Cordie, Jeff Randall, Jim Day, Mike Moreno

INTRODUCTION

The Dalles Dam has requirements for Columbia River fish passage that are specified in the annual Fish Passage Plan. The Dalles Dam has two fish ladders for upstream adult fish passage, as well as an ice trash sluiceway and spillway used for juvenile fish and downstream steelhead kelt passage. The following document is a summary of all fish passage system operation that occurred at The Dalles Dam in 2021. In addition Northern Wasco Co PUD owns and operates a small turbine that supplies auxiliary water to the north fishway, which has a complete juvenile bypass system. Information on this system can be acquired through Pacific States Marine Fish Commission weekly and annual monitoring reports.

FISHWAY OPERATING SCHEDULE

The following information includes fish passage system operation for calendar year 2021. Total length of time for annual fishway outages can be determined by referring to previous years' annual reports. These fishways were closed or dewatered for maintenance when they were not in operation.

East Adult Fishway

Jan 1 – Jan 25	Dewatered for winter maintenance
Jan 26 - Dec 1	Full operation
Apr 6 – Apr 21	AWS backup open for fish unit 2 forced outage
Dec 2 – Dec 31	Dewatered for winter maintenance.
Aug 4 AM	Attraction water off for required ROV grating inspection

North Adult Fishway

Jan 1 – Jan 25	Full operation
Jan 26 – Feb 22	Dewatered for winter maintence
Feb 23 – Dec 31	Full operation
Aug 4 PM	Attraction water off for required ROV grating inspection

Ice/Trash Sluiceway

Jan 1- Feb 28	End gate closed
Mar 1 – Mar 31	In service with 4 sluice gates open
Apr 1 – Nov 30	In service with 6 sluice gates open
Dec 1 – Dec 16	In service with 4 sluice gates open
Dec 16 – Dec 31	End gate closed

Spillway

Jan 1 – April 9	Closed, all gates on seal
April 10 – Aug 31	Opened per Fish Passage Plan
Sept 1 – Dec 31	Opened per Fish Passage Plan

FISHWAY DEWATERING PROCEDURES

Dewatering fishways provides the best opportunity for maintenance and inspection. To dewater the fishladders, exit bulkheads are installed and the ladder is allowed to drain. Entrance bulkheads are installed and dewatering pumps operated to dewater all areas of fishways below tailwater elevation. Fisheries personnel enter these areas to salvage trapped fish when water levels allow entry. Fish are pushed toward tailwater or captured. Captured fish are transported to forebay or tailwater, depending on location, fish species, age class and stress levels. A follow up inspection is made to capture any missed fish. Efforts are made to provide continual water supply during the entire operation to reduce fish stranding and stress. Fishway areas that cannot be dewatered are inspected by ROV underwater camera.

DEWATERING FISH SALVAGE

Efforts are always made to prevent fish mortalities. However, when mortalities occur, procedures are analyzed to determine how to correct for future dewaterings. This year 33 lamprey mortalities were found atop lower east ladder diffuser grating 2 days after the dewatering. They emerge from chamber under the grating where personnel access is not possible. Information provided to lamprey improvements PDT to determine if this is an area that could normally hold lamprey during the passage season. Potential solutions are being discussed.

FISH RECOVERY RESULTS

Navlock Dewatering Feb - Two poor condition steelhead were observed in floor laterals, but not recoverable.

North Fishladder Jan 26 – No fish

East Fishladder Dec 2 – 3 juv chinook, 1 ad steelhead, 11 juv steelhead, 1 ad coho, ~200 shad, 2 large sturgeon, 4 small sturgeon, 1 invasive walleye released to river. 33 Lamprey mortalities atop grating days after (MFR to FPOM)
East Lower Channels Dec 8 – 10 ad steelhead, 1 adult coho, 138 lamprey, 4 strugeon and 6 invasive walleye.

MAINTENANCE ACCOMPLISHMENTS AND PLANS

New seals installed on weir 158 to improve crest flow

Diffuser grating gaps found near east entrance during December ROV inspection. Dive repair Jan 2021. More gaps found Dec 2021 dewatering. Repairs made by replace and tack weld in place.

5 of 6 collection channel pumps rehab and installed Nov 2021.

North fishway rock wall reinforcement repair awaiting funding. Awaiting budget approval.

Annual vegetation removal north fish ladder. Success on blackberry removal with choker and telehandler.

New fishway entrance and exit weir automation approx 80% complete. Work resumed Dec 2021. Completion target Feb 2022.

North exit debris boom damaged by waves. Removed for repair, requires redesign of attachment brackets.

PUD rake system temp power for 2021 operation. PUD rake turned over to PUD staff for operation and maintenance, showing substantial improvement in intake rack cleaning time.

Evaluation of east fishway diffuser valves Dec 2021 to determine rehab plan

GATEWELL/INTAKE TRASH RACK DEBRIS MONITORING

Gatewell drawdowns are a frequent measurement of water level between forebay and gatewell used to determine turbine intake trashrack debris loads. As in previous years, all maintained well within the criteria limit (+ or – 1.5’). The Dalles dam is unique to other dams in that gatewell drawdown measurements have not been found out of criteria, nor has gatewell debris been a problem. However, the Fish Passage Plan requires that we periodically check for drawdown. Occasional juvenile salmonid mortalities were recorded during passage season but in very small numbers in 2021. Gatewell orifices are being permanently closed due to the absence of screens and conservation of water. This is done as units become available and workload allows. Forty two of 70 orifices have been closed. Intake trashracks are ROV checked twice yearly per Fish Passage Plan, for debris accumulation.

Inspection Criteria Comparison Chart								
	2021		2020		2019		2018	
The Dalles Dam	Total #	%	Total #	%	Total #	%	Total #	%
Number of inspections	691	100%	933	100%	882	100%	871	100%
NORTH FISHWAY	out of criteria							
Exit differential	0	0.00%	0	0.00%	0	0%	0	0%
Count station differential	0	0.00%	0	0.00%	12	1.40%	0	0%
Weir crest depth	0	0.00%	0	0.00%	2	0.20%	0	0%
Entrance differential	0	0.00%	0	0.00%	0	0.00%	1	0.10%
Entrance weir N1	0	0.00%	0	0.00%	0	0.00%	0	0%
Entrance weir N2	0	0.00%	0	0.00%	0	0.00%	0	0%
PUD Intake differential	100	14%	56	6.00%	17	1.90%	6	0.70%
EAST FISHWAY	out of criteria							
Exit differential	1	0.10%	0	0.00%	0	0.00%	0	0%
Removable weirs 154-157	9	1.30%	7	0.80%	39	4.40%	27	3.10%
Weir 158-159 differential	16	2.30%	19	2.00%	11	1.30%	33	3.80%
Count station differential	0	0.00%	0	0.00%	0	0.00%	0	0%
Weir crest depth at weir 153	10	1.40%	8	0.90%	8	0.90%	15	1.70%
Junction pool weir JP6	0	0.00%	0	0.00%	0	0.00%	0	0%
East entrance differential	6	0.80%	10	1.10%	81	9.20%	1	0.10%
Entrance weir E1	0	0.00%	0	0.00%	7	0.80%	0	0%
Entrance weir E2	18	2.60%	0	0.00%	65	7.40%	0	0%
Entrance weir E3	14	2.00%	0	0.00%	59	6.70%	0	0%
Collection channel velocity	2	0.30%	0	0.00%	1	0.10%	0	0%
West entrance differential	10	1.50%	9	1.00%	119	13.50%	1	0.10%
Entrance weir W1	12	1.70%	0	0.00%	113	12.80%	1	0.10%
Entrance weir W2	10	1.50%	0	0.00%	114	12.90%	5	0.60%
Entrance weir W3	0	0.00%	0	0.00%	0	0.00%	0	0%
South entrance differential	8	1.10%	9	1.00%	114	12.20%	1	0.10%
Entrance weir S1	20	3.00%	0	0.00%	118	13.40%	0	0%
Entrance weir S2	22	3.10%	6	0.60%	117	13.30%	4	0.50%
JUVENILE PASSAGE			0					
Sluicegate operation	0	0.00%	13	1.40%	7	0.80%	11	1.30%
Turbine trashrack drawdown	0	0.00%	0	0.00%	0	0.00%	0	0%
Spill volume			0	0.00%	0	0.00%	0	0%
Spill Pattern			1	0.10%	0	0.00%	0	0%
Turbine Unit Priority			215	23.00%	187	21.20%	30	3.40%
Turbine 1% Efficiency			0	0.00%		0.10%	3	0.30%

INSPECTION DISCUSSION

Some out of criteria events were the result of new automation commissioning and software that had to be modified to gate operation. Increase of PUD intake differential OOC due to rake transfer to PUD, and significant increases in aquatic weeds from upriver. Raking by hand at east count station pickets was significant and required 150 days of raking to avoid OOC differential at count station. Taking a closer look at aquatic vegetation type and life cycles in 2022. Native water stargrass (*Heteranthera dubia*) Eurasian watermilfoil and Potamogeton crispus found.

There were modifications to sluiceway gate operations due to crane rail replacement concrete work. Crane rail replacement work required shutdown of MU 1-3 for significant days from Sept. to Dec. 2021. Very few fish mortality were observed in gatewells due to sluiceway and powerhouse operations.

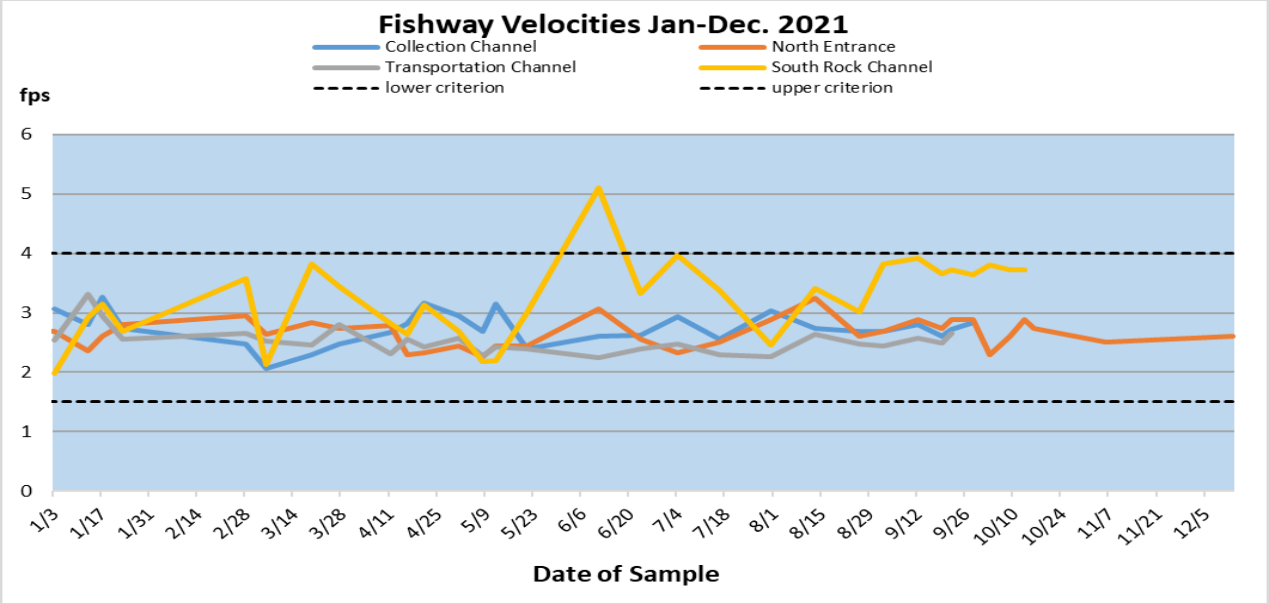
Due to Covid-19 restrictions no fisheries staff entered the powerhouse control room to collect spill data or other GDACs information in 2021. No data was collected regarding 1% efficency.

Unit priority: the first 20 days of March we were out of priority due to units 1 and 2 being OOS. From April to August notes in the files, OPstat and Fishwayz indicate the MUs were generally operating in priority. Those same sources indicate that due to crane rail work over MUs 1-4 those MUs were out of priority for the rest of the year 2021. For the juvenile salmon passage season April to August, the Main Units were in priority for ~150 days according to observations outside the powerhouse and from Operations Status reports. The remainder of the year the Main Units in March and from Sept. to December were out of priority due to maintenance for ~150 days.

Spill and Spill pattern are no longer monitored during inspections due to monitoring by other entities. It is reviewed if it impacts fish attraction at entrances and bird predation in tailwater.

WATER VELOCITIES

Fishway channel water velocities were measured weekly during Adult Fish Passage Season (Mar 1 - Dec 31).Floats were timed through all fishway channels that are supplemented by auxiliary water and results were provided in the project weekly fishway status report. Criteria velocities of 1.5 to 4 fps were generally maintained throughout the fish passage season, with a few intances of velocities >4 fps in the South Rock Channel. Velocities were not always taken at unit 22 due to turbulence preventing float tracking. Velocity is generally slower from junction pool to unit 21. Past University of Idaho analysis did not reveal fish passage delays in this area. High velocity values in September are due to low tailwater and are normal at this time of year in the south channel. It should be noted surface flows are slower than mid column and do not represent maximum flow velocity.

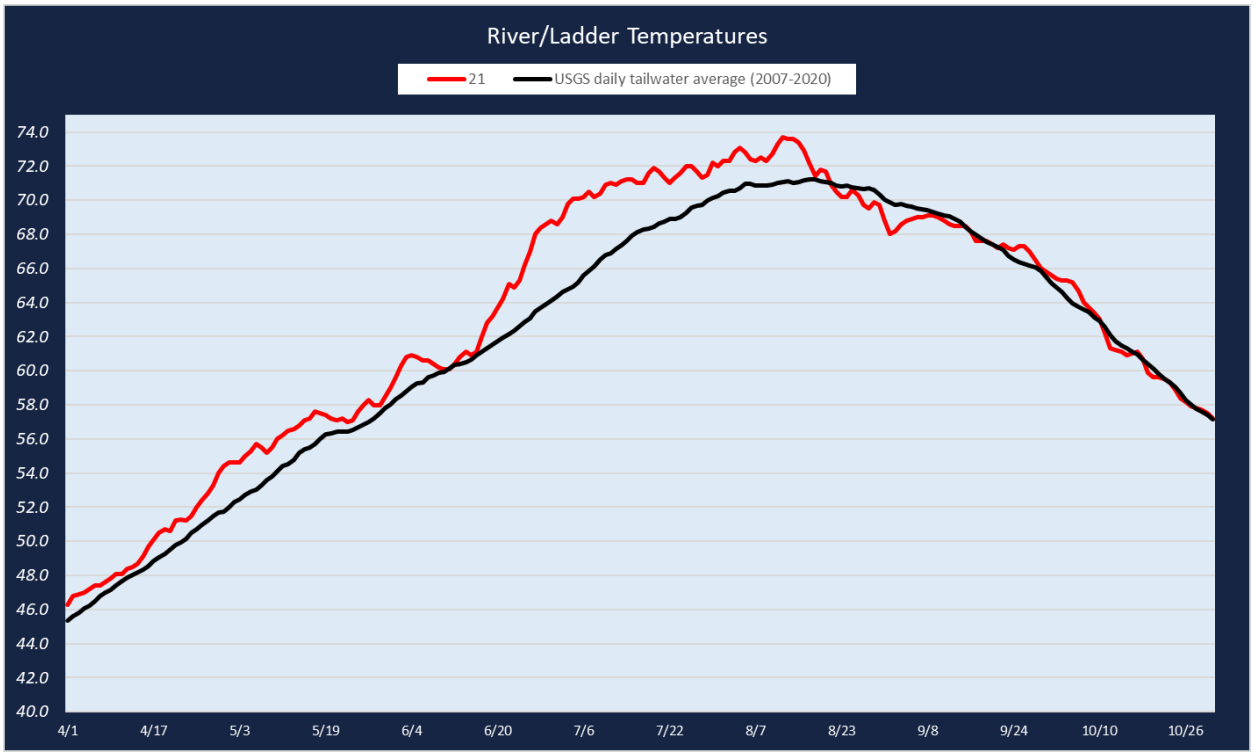


New Oceanic Mechanical Water Velocity Meter

A mechanical flow meter was purchased in 2021. Initial sampling was done to compare velocities obtained in various locations from the mechanical velocity meter and the previously employed method timing floating orange peels. Mechanical meter is spacially localized and free of fouling, obtains reliable data, taking about 15 minutes per measurement. Orange peel method has disadvantages of poor data quality, due to loss of peels, is spacially generalized and is unreliable due to surface turbulence and hangups or snags which can be labor time consuming (needing repeated sampling), taking about 15 minutes per measurement. Initial data comparison indicates localized velocities may be OOC more frequently than generalized data from old methodology.

WATER QUALITY

Temperature monitoring with data loggers in each fishway is provided weekly in the fishway status reports. Additional monitoring will be done to determine differences from upper to lower ladder as anlyized by FPC. The following graph is a compilation of weekly readings collected by data loggers in the east and north fishladders. Readings are taken immediately upstream of the count stations and the lower entrance area of each ladder.



CALIBRATION

Calibration (comparing digital display and staff gauge readings vs tape measure or laser) checks on all water levels and movable weirs/gates done weekly to assure accuracy. Maintenance is notified when they are found off by more than + or -0.3'. Human error and weather conditions are factored into the results and sometimes leave voids in data table below (mechanical problems in yellow, spill related problems in blue).

	2/4/2021	2/13/21	2/26/21	3/6/21	3/18/21	3/26/21	4/1/21	4/15/21	4/20/21	4/28/21	5/1/21	5/19/21	5/31/21	6/9/21	6/19/21	7/1/21	7/14/21	7/29/21	8/12/2021	8/18/2021	8/31/2021	9/11/2021	9/14/2021	9/21/2021	9/27/2021	10/7/2021	10/11/2021	10/19/2021	10/25/2021	11/4/2021	11/15/2021	12/5/2021
no criter	1	-2.37	-2.37		-1.1	-1.1	-1.1	-1.2	-1.22	-1.12	-1.06	-1.42	-1.23	-1.23	0.3	-1.15	-0.8	-0.81	-0.74		-1.4	-1.1	-0.94	-0.94	-0.99	-0.94	-0.97	-0.94	-1	-1	-1.04	
E2	0	-0.7	-0.62		0.16	0.13	0.26	-0.17	-1.34	-0.28	-0.27	-0.3	-0.2	-0.3	-0.3	0.28	0.1	0.1	-0.3		0.16	0.1	0.06	0.06	0.07	-0.11	0.09	-0.14	0.19	-0.2	-0.02	
E3	0.05	-2.3	-1.45		-0.25	-0.2	-0.22	-0.62	-1.77	-1.1	0.88	1.46	0.46	-0.22	0.22	0	0.3	0.73	0.18		0.8	0.3	0.48	0.63	0.71	0.31	0.63	0.31	0.84	0.47	0.52	
W1	-0.88	-0.28	0.02	0.02	0.12	0.02	0.17	0.52	0.02	-0.08	-0.28	0.22	0.12	-0.08	0.32	0.12	0.02	0.22	0.02		0.1	0.07		0.11	0.06	0.02	0.12	0.02	0.05	0.01		
W2	-0.58	-0.18	-0.08	0.42	0.22	0.22	0.22	0.22	0.12	0.22	-0.33	-0.08	0.12	-0.08	0.02	0.32	0.22	0.22	0.32		-0.21	0.12		0.32	0.2	0.34	0.25	0.25	0.54	0.19		
W3 closed	0.12	-0.28	-0.28	0.12	0.02	0.12	-0.08	0.02	0.12	0.12	-0.08	-0.08	0.09	-0.08	-0.16	0.12	0.12	0.02	0.12		0.07	0.02		0.04	0.04	0.04	0.02	0.12	-0.09	-0.09		
S1	-0.8	1	-0.69	-0.08	0.03	0.77	0.49	0.26	0.14	-0.08	-0.47	-0.25	-0.09	-0.2	0.31	-0.37	-0.25	0.33	0.03		0.12	0.04	-0.16	-0.08	0.08	0.64	0.02	0.11	0.11	0.06	0.09	
S2	0.7	-1.9	1.2	-1.85	-1.63	-0.98	-1.01	-1.1	-1.32	-1.77	-0.08	-0.09	0.16	0.08	0.28	0.14	0.18	1.03	0.6	-0.41	0.84	0.66	-0.6	0.71	0.65	0.65	0.68	0.72	0.64	0.64	0.63	
N1	na	na		0.19	0.21			0.2	0.27		0.26	0.19	0.34			0.2	0.22	0.27	0.25	1.13	0.31			0.26	-0.83	0.12	-0.23	1	0.12	0.19		0.19
159	0	0	0.1	0.2	0	0.2		0	0	0	0	0		0.3	0.1	0.2	0	0.2	-0.2		0	0	0	0	0	0	-0.1	-0.2	0	-0.2		
158	0	0	0.1	0.1	0	0.1		0.1	0	0.1	0.1	0.2		0.3	0.1	0.1	0.1	0.1	0.1		0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2	0.2	0.2		
E Chan	-0.1	0	-0.07		-0.02	-0.06	0.02	-0.2	-0.13	-0.1	0	-0.09	-0.07	-0.12	-0.09	-0.01	-0.09	-0.18	-0.21		0	-0.13	-0.33	-0.19	-0.13	-0.18	-0.01	-0.18	-0.08	0.1	-0.3	
E TW	-0.15	0.06	0.23		0.33	-0.01	-0.17	0.05	0.2	-0.2	-0.02	-0.02	-0.14	-0.13	-0.03	-0.07	-0.1	-0.24	-0.1		-0.1	0.09	-0.08	-0.25	-0.08	-0.13	-0.18	-0.21	-0.05	0.14	-0.04	
W Chan	-1.5	0.1	0	0	-0.1	0.1	0.2	0.1	0	0.05	0.1	0.05	0.1	-0.05	0.1	0.7	0.1	-0.13	0.3		0.06	0.11		0.02	-0.02	0.12	0	-0.04	-0.06	0.11		
W TW	-0.4	-0.2	-0.1	0	-0.8	0	-0.2	-0.2	-0.2	-0.3	0.02	-0.2	-0.15	-0.1	-0.3	0.4	-0.3	-0.25	-0.2		-0.17	-0.12		-0.24	-0.02	-0.02	-0.06	0.02	-0.05	-0.15		
S Chan	0.3		-0.02	-0.09	-0.3	-0.18	-0.15	-0.05	-0.25	-0.21	-0.2	-0.11	-0.15	-0.39	-0.34	0.3	-0.23	-0.11	-0.26	-0.1	0.92	-0.21	0.7	-0.2	-0.16	-0.13	-0.23	-0.17	-0.21	-0.25	-0.21	
S TW	0.3		-0.01	0.93	-0.3	-0.41	-0.38	0	-0.25	-0.1	-0.56	-0.7	-0.9	-0.72	-0.71	-0.2	-0.5	-0.4	-0.37	-0.1	-0.15	-0.39	-0.53	-0.44	-0.41	-0.4	-0.33	-0.34	-0.39	-0.35	-0.42	
N Chan	0			-0.2	0.1			-0.05	-0.1		0.2	0	0.15	0.17	-0.11	-0.13	0.3	0.05	-0.04		-0.28			-0.1	-0.17	-0.08	-0.11	-0.24	-0.13	0.01		0.01
N TW	0			0.02	0.09			0.44	0.18		-0.33	0.24	-0.73	0.38	0.05	0.1	0.54	0.18	-0.13		0.22			0.07	0.12	0.01	0.22	0.06	0.11	0.08		0.12
E FB	-3		-0.4	-0.2	0	0	0	-0.1	0		-0.1	0	-0.2	-0.3	-0.3	0	0.2	0	0.1		0.3		0	-0.2	0.4	0.1	-0.2	-0.1	-0.1	0	0	
N FB			-0.1	0.1	-0.1	0.1	0	-0.1	0		-0.1	-0.2	0	-0.1	-0.1	-0.2	0	0	0.1					-0.1	0.1	0	0.2	0.1	0.1	0	-0.2	0

Calibration Discussion

Out of calibration readings that require maintenance are indicated by highlight. Out of calibration that was likely the result of high tailwater, wind or other environmental factor was highlighted. Season 2021 had 58 out of calibration recorded due to inability to adjust moving gates at east entrance (no events out of criteria). Prior seasons totals include; 2020 = 16, 2019 = 46, 2018 = 63, 2017 = 127, 2016 = 32, 2015 = 24, 2014 = 22 and 2013 = 28.

In 2021 the reduced activity on project minimized work adjacent to east ladder, while maintenance staff did troubleshooting on automation at entrances/exits. Requests for maintenance were limited to power reset at east entrance where software problems led to occasional system software failure. Software resolutions to automation installations at entrances helped keep gates in criteria. Installations and upgrades to east automation may resolve many of these calibration issues at the east entrance.

Allowances were made for out of calibrations gates that would not affect criteria. Fisheries worked with maintenance staff to adjust software at entrances through calibrations in all weeks. New components to automation system were installed during 2020/2021 for north and east fishway entrances and exits. New automation was active in early 2021 and fisheries staff standardized procedures with maintenance as old components were decommissioned. Further upgrades should reduce the number of calibration issues in coming years.

AVIAN PREDATION

The three main piscivorous birds observed at The Dalles during juvenile salmonid migration are California Gulls, Double Crested Cormorants and American White Pelicans. The United States Department of Agriculture (USDA) was contracted to provide avian hazing abatement via pyrotechnics from April 16 – July 31 for Gulls and Cormorants only. Hazers were present during all daylight hours (~06:00-20:00). Generally, hazing by boat occurred the first half of the day (8hrs), then hazing continued from the peninsula downstream of the Dalles bridge (SW4, 6 hrs). There were periods of time that hazers could not use pyrotechniques due to barges and/or heavy wind days. USDA hazers concentrated specifically on zones upstream and downstream of the US-197 bridge but made frequent visits to east ladder entrances, 180 bend and east exit to use pyrotechnics to deter great blue herons and cormorants. Shortages of ammunition, staff and vessel breakdowns limited hazing efforts at times.

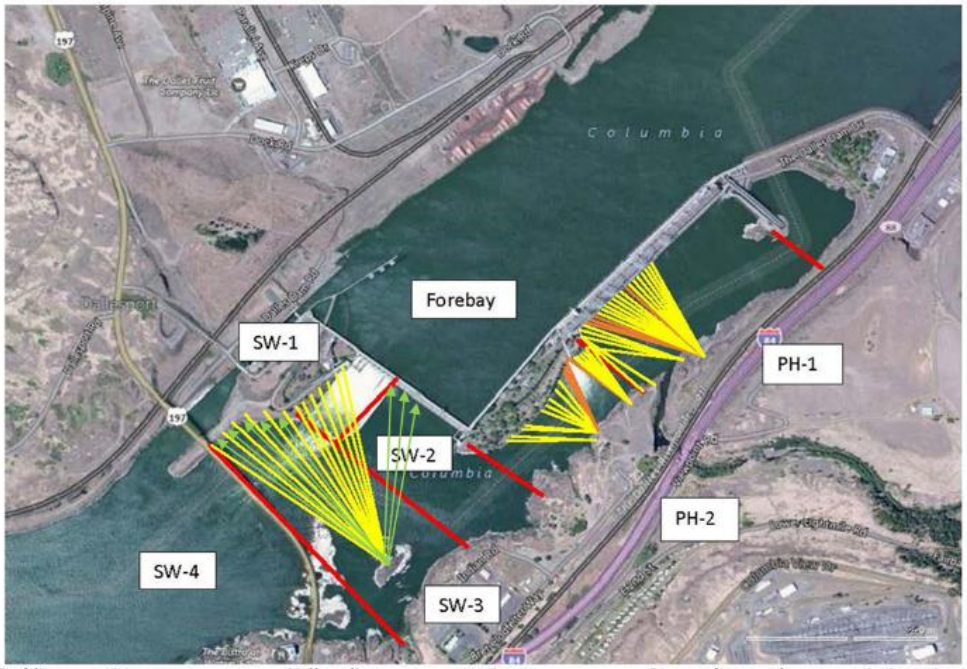
Falcon Test

A trial of falconry was performed in late July 2021 by contractor, Integrated Avian Solutions for 5 days. The results were uncertain but proved safe and effective in all circumstances and have promise of future use in deterring gull feeding. Contract process was begun in Sept. 2021 to hire falconer to provide service in early April, 2022 to address

lack of active hazing at that time and increasing April GULL counts.

AVIAN LINES

Avian lines are also installed and maintained as needed. See figure below for avian line locations. Lines were added (in green) in 2018 for more effectiveness through variable spill ranges. Partial netting was effectively applied over east fishladder weirs downstream of the 180 bend to deter up to 15 great blue herons. Monitoring will continue



LASER HAZING

Agrilaser (handheld laser) use was begun again in October, 2021, and limited to targeting Cormorants. Agrilaser use continued during the winter months 2020/2021 to deter breeding cormorants from nesting on forebay powerline towers. After April 2021 the green laser was ineffective at deterrence and nesting continued, increasing to 65 attempts. After June 2021 record hot weather event USDA avian hazers reported seeing numerous bird mortality and nests on BPA towers appeared abandoned as were osprey nests around the powerhouse and north ladder locations

CONCERNING TREND!

This graph shows the general trend of the three key piscovorous birds at the Dalles dam. All birds are counted daily in all zones, alternating morning and afternoon. While all 3 species show a general increase, the numbers of gulls (california and ring-billed) and pelicans have risen dramatically. General increases have been observed for 20 years

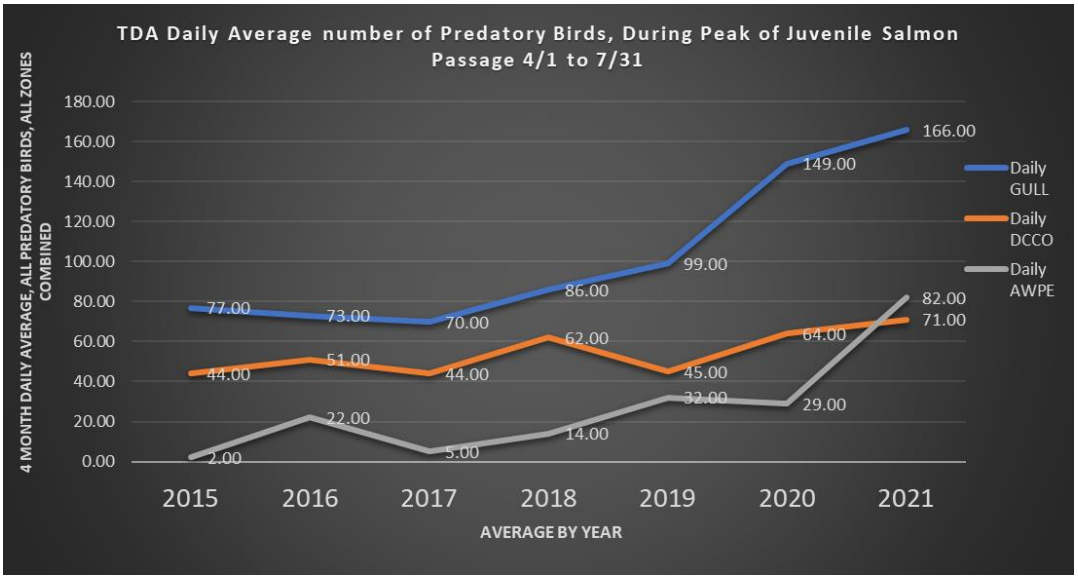
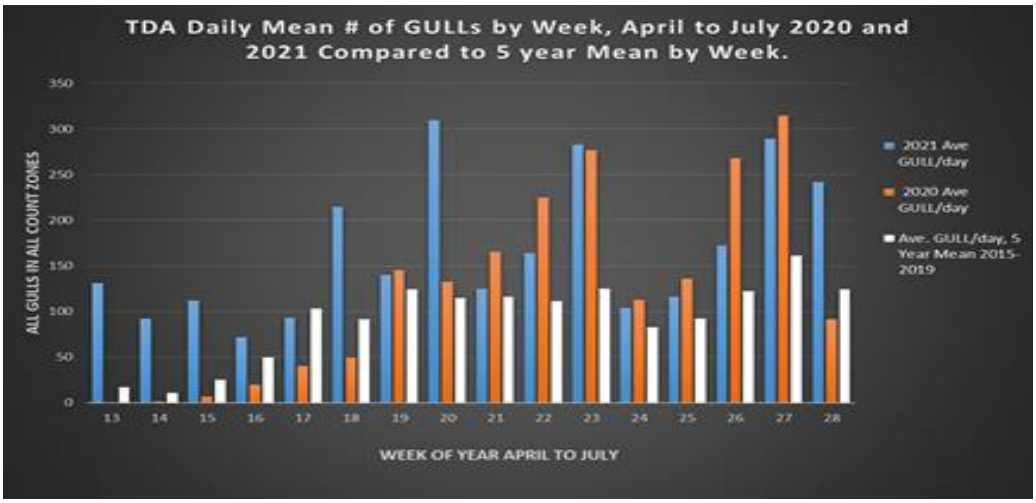


Table compares the average number of the three key salmon predator birds at the Dalles counted in daily zones alternating morning and afternoon counts. While cormorants seem to have a slow increase the numbers of gulls (california and ring-billed) have continued to rise and numbers of pelicans rose dramatically in 2021.

Daily Mean Gull Counts by Week.

Gull presence during juvenile salmon out-migration is a mixture of California, Ringbill and some Western. Feeding birds arrived earlier in 2021. Spill volume was low, allowing birds to move close to the spillway to feed below whitewater in SW3 (below avian lines) and SW4 (downstream of bridge).



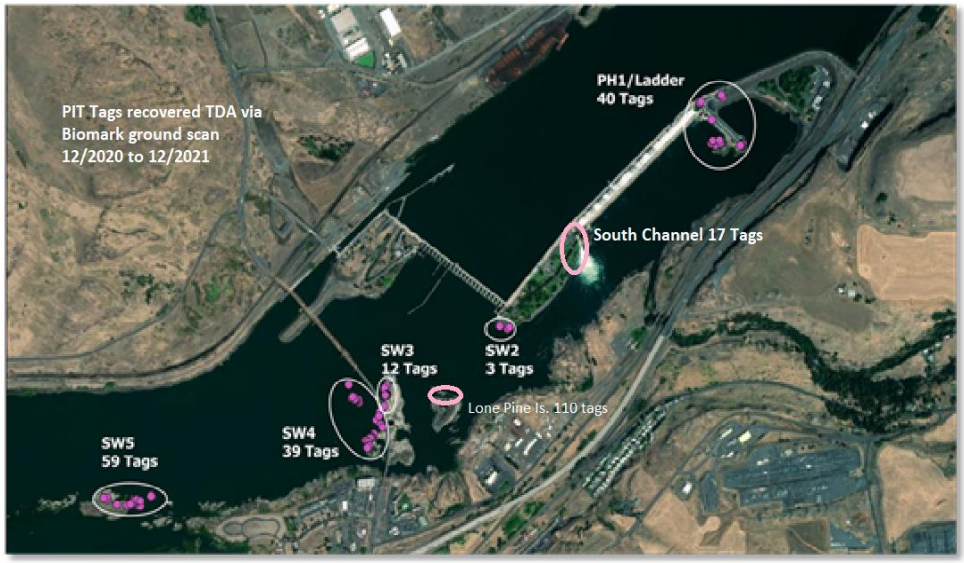
Pelican Dip and Tip Counts, and GULL, AWPE Early Arrival.

Total numbers of American White Pelicans have steadily increased each year and significant numbers arrived in early April of 2021. In an effort to determine pelican prey, dip and tip counts were taken in 2019 and 2020. Previous observations and data indicate pelicans are likely targeting adult shad mortality during most of the juvenile salmon passage season. Pelicans arrived early in April in 2021 and high resolution video showed them target small prey (less than 150mm) for several weeks in April. Its possible that pelicans may not pose a significant threat to salmon but they may target small prey when shad are not available. Further diet sampling by wildlife managers (not Corps of Engineers) is needed for diet confirmation. PIT tags of juvenile salmon were found in 2020 and 2021 on rocks occupied during salmon passage in areas shared by Gull, Pelican and Cormorants.

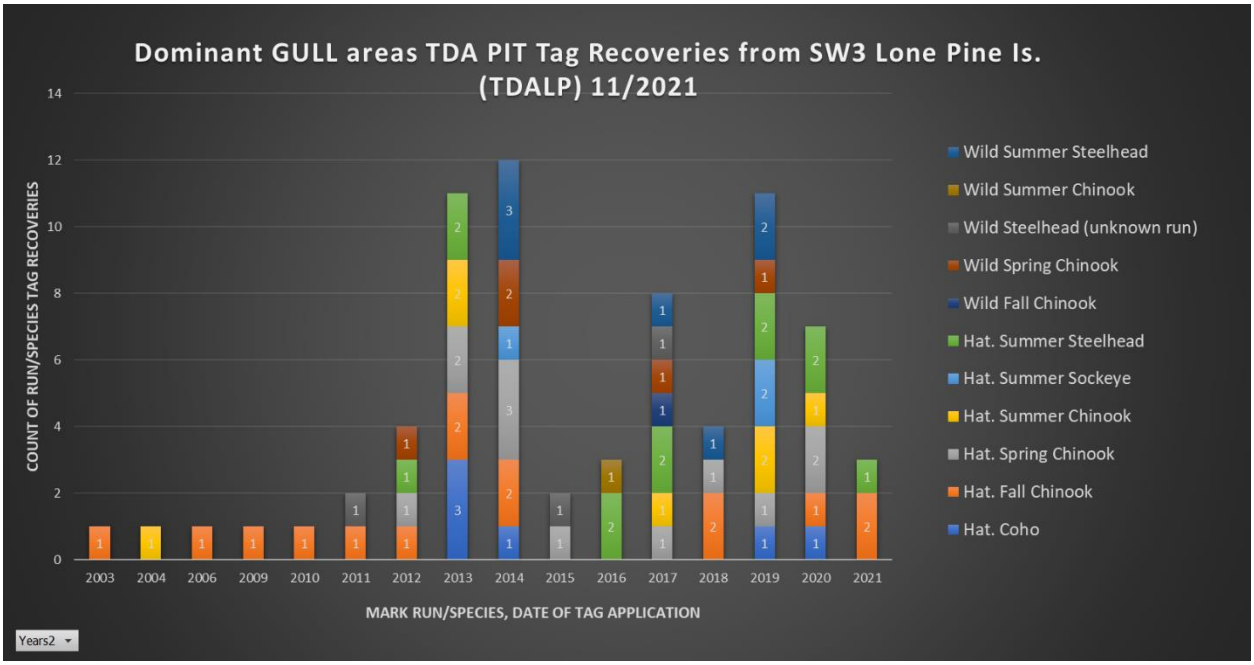
Systematic observations of Pelican dip and tips were conducted from June to mid August of 2019/2020 but not in 2021. Incidental observations by video in April, 2021 showed frequent dips for small prey in the outfall of the spillway SW3, possibly eating juvenile salmon. By May adult shad were available for prey and Pelicans fell back into typical shad feeding in SW4.

PIT Tag Recovery and Upload

In order to study the impact of predatory birds on juvenile salmon a biomark PIT tag scanner was used to search areas in SW4, SW3, PH1 and within the east fish ladder while de-watered. Numerous tags were detected



Further analysis of the tag histories and locations are underway. Ground scans were conducted in late 2020 during east ladder dewatering and in January/February of 2021 on islands near dam. Scanners were used to search common avian predator resting areas adjacent to feeding areas with sand and rock substrates. Fishway substrate was typically concrete with PIT tags located in piles of sand, gravel and expansion joints. The source of the tags is unknown with the possibility that they are shed by salmon or that tags are the result of consumption and deposition by predators. Tags found on downstream islands are most abundant at known avian predator resting locations and were all salmon and steelhead. Two avian colony sites were created with the help of PTAGIS staff and RTR researcher, Allen Evans. Sites created are (TDALP-Lone Pine island) and (TDATMI-Three Mile Islands). Tag recoveries from east ladder will be uploaded to existing site TDAMRT that has records of tags associated with the pikeminnow dam angling program whose recoveries including tagged small mouthed bass.



Avian Discussion

Project fisheries staff provided daily avian counts for the entire year. The highest bird counts were on the spillway side of the dam downstream of The Dalles US-197 bridge (SW4). Cormorants have shown a slow and steady increase, with more recent foraging near dam, especially at the east fishladder exit. Foraging gull and pelican showed a substantial increases. Gulls arrived earlier in 2021 season relative to previous years. It obvious avian predators are becoming a major problem at The Dalles and requires further action to adequately protect juvenile salmon outmigrations. Present approved abatement methods are not working. Other piscvorous, less problematic birds included grebes, mergansers, and eagles. Grebes were observed in the summer but the vast majority of grebes and mergansers were in the fall and winter months during the juvenile shad outmigration. There continues to be high numbers of Bald Eagles overwintering in Westrick Park, feeding primarily on post-spawn adult shad. Previous studies have shown no impact with avian lines. Refer to Fisheries Field Unit "Evaluation of Interaction Between Overwintering Bald Eagles and the Avian Line Array at The Dalles Dam 2013" report for further details.
Miller Island is a well known nesting colony of primarily California Gulls and to lesser extent Ringbill Gulls. PIT tag recovery efforts from the island has revealed substantial predation on ESA listed salmonid species. There is a high likelihood that this predation occurs below The Dalles and John Day.
Efforts are being made to increase the avian abatement success within agency guidelines. Avian lines were maintained, hazing schedule is scrutinized and other means of abatement, such as falconry are being tested. The use of lethal removal at the dam has been requested by project since 2015 when the evidence of alarming PIT numbers was found on Miller Island gull colony. This action is still not approved

Piscivorous Fish Predators

Washington Department of Fish and Wildlife pikeminnow dam angling continued primarily from the powerhouse tailrace deck. A total of 1,384 pikeminnow were removed, slightly higher than the total from John Day. Details can be found in the annual report.
It should be noted that invasive bass and walleye bycatches continued to be released back to river alive, due their status as a gamefish with Washington and Oregon. There is overwhelming scientific evidence collected over decades to show these invasive fish do in fact prey on juvenile salmonids. The Independent Scientific Review Board estimated several years ago that the predation benefit estimate from the pikeminnow removal program was reduced from 27% to 11% due to protection of non-native predators/gamefish. Control of these predators is overdue.

Zebra/Quagga Mussel Monitoring

-6 mussel samples were collected in 2021.

No *Dreissena* mussels were detected during USACE and PSU early detection monitoring throughout the Columbia River Basin in 2021. Monitoring was focused on water bodies with a high to medium likelihood of *Dreissena* mussel introduction and/ or establishment during the period of expected peak mussel spawning based on water temperature (July – September). Sampling also occurred in June and October to account for the uncertainty associated with predicting mussel spawning and water temperatures. The Dalles staff contributed 6 of the basin wide samples in 2021.
2021 Final Report, Steve Wells, Aquaticus LLC Rich Miller, Catherine de Rivera, and Mark Sytsma
Portland State University

SEA LIONS

No sightings in tailrace during 2021.

RESEARCH

The following are a list of fish related research and contract personnel that were on site during the 2021 passage season;

Avian Solutions Integrated – Falconry contractor conducted trial of avian abatement.

4 Peaks – Fish counting contractors performed fish counts at the north and east fishways via count stations.

Oregon Dept of Fish and Wildlife –Captured, tagged, and collected biological data from northern pikeminnow as part of an evaluation of the Northern Pikeminnow Management Program.

Washington Department of Fish and Wildlife – Pikeminnow dam angling crew.

Oregon Department of Fish and Wildlife and Fish Passage Center – Continued to provide once monthly fishway inspections of adult and juvenile systems.

Pacific States Marine Fish Commission – FERC required sampling at the Northern Wasco County PUD intake structure as per the Coorperative Agreement between Pacific States Marine Fisheries Commission and Wasco County PUD.

Pacific States Marine Fisheries Commission PTAGIS Information System – monitored Thin Wall PIT Tag detection system in The Dalles east and north count stations.

U.S. Dept of Agriculture – Provided avian hazing of piscivorous birds to reduce avian predation on juvenile salmonids May to August via pyrotechnics during juvenile passage season.

U. S. Geological Survey – Total Dissolved Gas (TDG) and water temperature monitoring.

CTUIR - Captured adult Pacific lamprey as part of the on-going project to restore lamprey to various tributaries.

END OF REPORT

Approved by; Ron Twiner, Operations Project Manager, The Dalles Dam