2023 ANNUAL FISHWAY STATUS REPORT

THE DALLES DAM

The Dalles fisheries;

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INTRODUCTION

The Dalles Dam has specific requirements for Columbia River fish passage included 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 2023 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.

The following are dates fish passage systems were in service during 2023;

East Adult Fishway – In service 1/11/23 thru 12/5/23

North Adult Fishway – In service 2/16/23 thru 2/6/24

Ice/Trash Sluiceway – Open for fish passage 3/1/23 thru 12/15/23

Spillway - Open for fish passage 4/10/23 thru 8/30/23

FISHWAY DEWATERING PROCEDURES

Dewatering fishways provides the best opportunity for maintenance and inspection. To dewater the fish ladders, 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 safe 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 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 Results

Navlock Dewatering 3/7 – No fish

North Fishladder 1/17– 20 adult coho, 9 adult chinook, 16 lamprey released to river before aborting due to too many fish. 7 coho died in process.

North fishladder entrance - not dewatered

East Fishladder 12/7 –10 lamprey, 13 juvenile steelhead, 1 juv chinook, 3 sturgeon released to river. East Lower Channels 12/13 – 5 adult coho, 31 lamprey

MAINTENANCE ACCOMPLISHMENTS AND PLANS

-East exit weirs 156 and 157 lamprey orifices (1.5”x12”) cut into bottom of weirs per PDT direction
-Planning removal of JP2 and JP4 weirs and gearboxes due to lack of need. Investigating need for JP6
-North fishway rock wall reinforcement repair awaiting budget approval.
-Annual vegetation removal north fish ladder postponed. Possible contractor
-West and south entrance weir motors replaced
-East entrance gearbox seal repaired
-East entrance grating repaired following midseason dive repair.
-Count station brush system repaired
-Weir 158 seal repaired
-Finish SCADA output to fisheries office

Historical Overview of Fishway Modifications

1985 – East fishladder count station and weir modified
1985 – North fishladder exit and weir modified
1990 – N Wasco PUD turbine installed for generation from attraction flow
1997 – North AWS plunge pool rock reinforcement mining straps
1997 – South and north unused side entrances poured concrete wall
2000 – Occlusion plates installed on sluicegates FU1-MU3 (failed passage improvement)
2000 – Fishway automation PLC installed
2000 – Sluiceway surface collector tested
2000 –Closure of all powerhouse floating orifice gates
2001 –Grating replacement north fishway entrance
2002 – spillway vortex suppression device tested
2000 – East Fishway Dewatering Improvements (added pumps, new dewater bulkheads, new entrance weirs)
2003 – J frame modification to occlusion plates (failed passage improvement again, removed several years later)
2005 – Entrance weir extensions to prevent continued cable failures
2006 – Spillway 1-9 new wire ropes and gearboxes
2007 – Spill wall 7/8
2010 – Spill wall 8/9
2010/11 – Grating replacement east fishway Junction pool, east entrance, west entrance, south entrance
2010 – Count stations pickets raised 1.5" (lamprey improvement)
2012 – East exit weir 159 weir rehabilitation
2012 – Floor ramps for lamprey installed in floor of 2 east ladder weir steps
2013 – East exit weir 158 replaced with 2 leaf design
2014 – Floor plating over grating for lamprey improvement installed in orifices of lower east ladder weirs
2015 – East fishway Auxiliary Water System backup system
2017 – East ladder exit FCQ7 power supply replacement
2017 – Entrance weir rounded caps for lamprey improvement
2019 – East exit derelict guides plated for lamprey improvement
2020/23 – Fishway automation PLC and level sensor replacement
2022/23/24– Exit weir 154-157 lamprey orifices added and passage LPS installed east ladder junction pool

Inspection Discussion

The following inspection results show a relative steady state for most fishway areas in 2023. Notable changes to fishway operation include:

- The East Fish Ladder required repairs on the east entrance grating. Fish Unit flows were stopped from 8/16 to 8/23 while divers worked on temporary fixes. This led to several entrance numbers being out of criteria during this time.
- Once the grating work was completed, fish unit flows were reduced from ~5 kcfs each to ~4 kcfs for the rest of the fish season. These reductions in Fish Unit flows were necessary for the temporary grating repair to hold through the rest of the season. This change, combined with low river volume in the summer and fall months, caused higher non criteria, usually only 0.1'-0.2 on entrance weir depths.

Inspection Criteria Comparison Chart								
	2023		2022		2021		2020	
The Dalles Dam	**Total #**	**%**	**Total #**	**%**	**Total #**	**%**	**Total #**	**%**
Number of inspections	636	100%	641	100%	691	100%	933	100%
NORTH FISHWAY	**out of criteria**							
Exit differential	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Count station differential	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Weir crest depth	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Entrance differential	1	0.2%	0	0.0%	0	0.0%	0	0.0%
Entrance weir N1	2	0.3%	0	0.0%	0	0.0%	0	0.0%
Entrance weir N2	0	0.0%	0	0.0%	0	0.0%	0	0.0%
PUD Intake differential	10	1.6%	31	4.8%	100	14.0%	56	6.0%
EAST FISHWAY	**out of criteria**							
Exit differential	NA	NA	NA	NA	1	0.1%	0	0.0%
Removable weirs 154-157	6	0.9%	2	0.3%	9	1.3%	7	0.8%
Weir 158-159 differential	0	0.0%	15	2.3%	16	2.3%	19	2.0%
Count station differential	1	0.2%	38	5.9%	0	0.0%	0	0.0%
Weir crest depth	0	0.0%	17	2.7%	10	1.4%	8	0.9%
Junction pool weir JP6	0	0.0%	0	0.0%	0	0.0%	4	0.0%
East entrance differential	7	1.1%	8	1.2%	6	0.8%	10	1.1%
Entrance weir E1	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Entrance weir E2	27	4.2%	7	1.1%	18	2.6%	0	0.0%
Entrance weir E3	17	2.7%	5	0.7%	14	2.0%	0	0.0%
Collection channel velocity	2	0.3%	16	2.4%	2	0.3%	0	0.0%
West entrance differential	5	0.8%	0	0.0%	10	1.5%	9	1.0%
Entrance weir W1	25	3.9%	5	0.8%	12	1.7%	0	0.0%
Entrance weir W2	50	7.9%	2	0.3%	10	1.5%	0	0.0%
Entrance weir W3	0	0.0%	0	0.0%	0	0%	0	0.0%
South entrance differential	5	0.8%	9	1.4%	8	1.1%	9	1.0%
Entrance weir S1	14	2.2%	17	2.6%	20	3.0%	0	0.0%
Entrance weir S2	24	3.8%	26	4.0%	22	3.1%	6	0.6%
JUVENILE PASSAGE	**out of criteria**							
Sluicegate operation	0	0.0%	0	0.0%	0	0.0%	13	1.4%
Turbine trashrack drawdown	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Spill volume	NA	NA	NA	NA	NA	NA	0	0.0%
Spill Pattern	NA	NA	NA	NA	NA	NA	1	0.1%
Turbine Unit Priority	NA	NA	NA	NA	NA	NA	215	23.0%
Turbine 1% Efficiency	NA	NA	NA	NA	NA	NA	0	0.0%

Gatewell/Intake Trash Rack Debris Monitoring

Gatewell drawdowns are a frequent measurement of water level differential between the forebay and the unit gatewells. This measurement is used to determine turbine intake trashrack debris loads. As in previous years, all maintained well within the criteria limit of plus/minus 1.5'. The Dalles Lock and 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. In addition, intake trashracks are ROV checked twice yearly per Fish Passage Plan, for debris accumulation. Infrequent juvenile salmonid mortalities were discovered in gatewells during passage season in 2023.

Aquatic Vegetation Concern

After last year's fish unit intake trash rack plugging with aquatic vegetation, gatewell differential monitoring was more frequent in 2023. Differential stayed under 1.5' through the season. Plans are in place to use the derelict fish unit trash rack rake if the problem returns. Monitoring will continue. Portland State University sampled and detected non-native species;

● *Myriophylllum spicatum,* which was found in the Columbia River (Below Bonneville),

Columbia River (Lake Bonneville), Columbia River (Lake Celilo),

● *Potamogeton crispus,* which was found in the Columbia River (Below Bonneville),

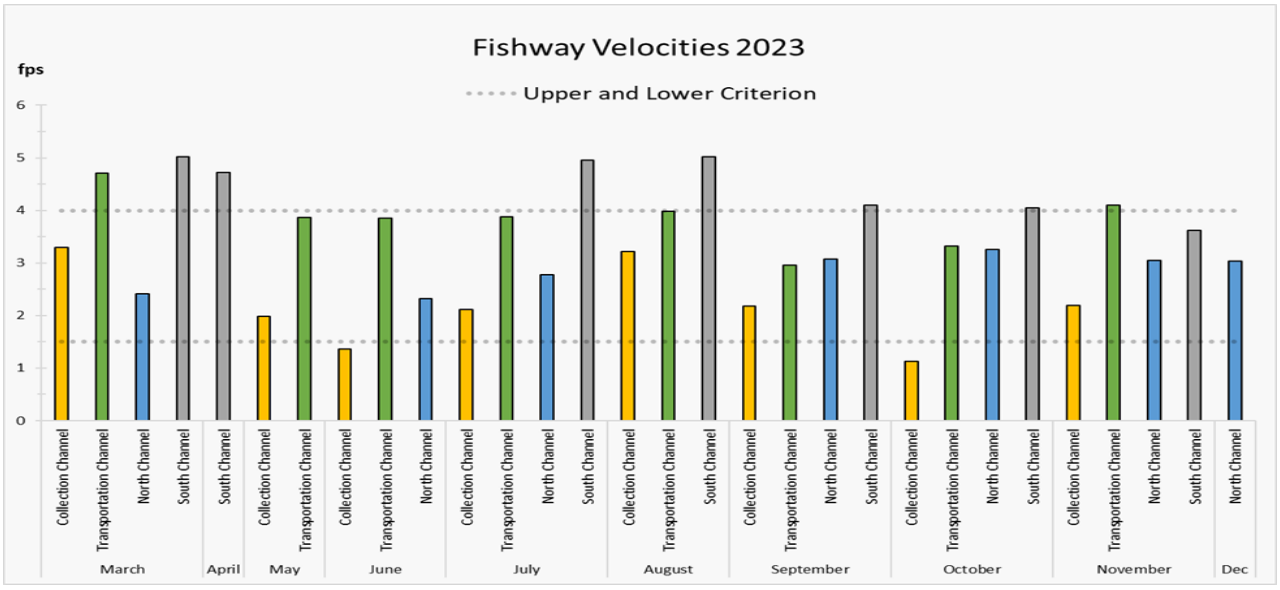
Columbia River (Lake Celilo), Columbia River (Lake Wallula), Snake River, Below Ice

Harbor Dam, and Umatilla River.

Water Velocity

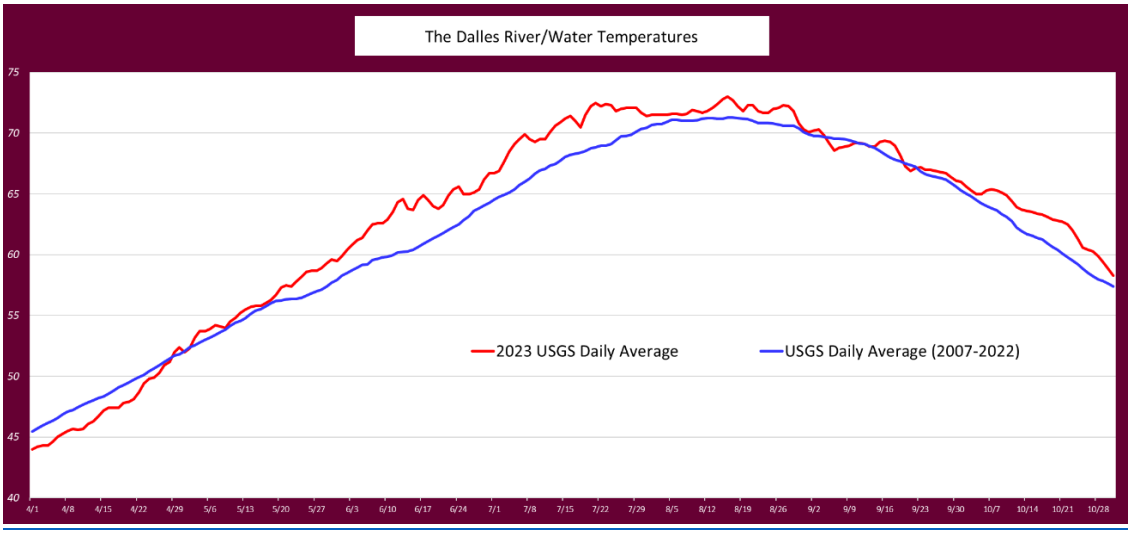
The following visual shows averaged monthly velocities for our several fishway channels. Most fall within the flow criteria of 1.5 fps – 4 fps (feet per second).

The South Channel was generally above or right at 4 fps and the Collection Channel was mostly within criteria except for the months of June and October, when it was just short of the lower criterion.



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 analyzed by FPC. Stillwells will be added to west and south entrances. Readings are taken immediately upstream of the count stations and the lower entrance area of each ladder. Refer to link using The Dalles as destination. [The Dalles River/Water Temperatures]



CALIBRATION

Calibration checks on fishways are completed weekly to ensure the accuracy of both digital readings (derived from mathematical programs and sensors) and staff gauge readings. These calibrations involve comparing the digital displays and staff gauges on all water levels and movable weirs against a handheld laser distance meter.

Maintenance is notified when the laser calibration measurements are out of criteria for consecutive weeks. Out of criteria means the laser measurement is different from the digital display or staff gauge measurement by more than + or - 0.3'. Those calibrations that are out of criteria for a likely mechanical issue are shown highlighted in yellow . At times, human error can contribute to an OOC calibration. These are also marked in yellow highlight but did not require service because the calibration was not out of criteria for consecutive weeks.

Additionally, environmental conditions (high tailwater, wind, spill, etc.), can lead to an out of criteria calibration. Out of criteria calibrations affected by these conditions are shown highlighted in blue . Those below shown in blue are from the North ladder entrance tailwater and were likely caused by spill slop.

The 2023 season had 70 out of criteria calibrations. Prior seasons OOC totals include: 2022 = 94, 2021= 58, 2020 = 16, 2019 = 46, 2018 = 63.

The Dalles	1/9	2/7	2/19	3/1	3/8	4/1	4/8	4/19	5/5	5/13	5/24	6/3	6/12	6/25	7/6	7/14	7/24	8/5	8/27	9/6	9/13	9/19	9/26	10/3	10/9	10/16	10/24	11/2	11/13	11/24	12/3	12/16
E 1 no criteria	NA	0.5	NA	NA	0.5	0.5	0.5	0.6	0.5	NA	1.6	0.4	0.5	0.6	0.4	0.5	0.5	0.6	0.4	0.3	0.4	0.3	0.4	0.4	0.6	0.4	0.3	0.4	0.4	0.3	NA	NA
E2	NA	1.3	1.3	1.1	0.2	0.3	0.3	0.3	-0.2	-0.3	-0.4	0.1	0.4	0.3	0.3	0.2	0.3	0.4	0.1	0.3	0.3	0.2	0.1	0.3	0.3	0.2	0.2	0.2	0.1	0.1	NA	NA
E3	NA	0.2	0.2	0.3	0.3	0.4	0.3	0.3	0.2	0.8	0.4	0.4	0.5	0.4	0.5	-0.4	0.2	0.4	0.3	0.3	0.3	0.2	0.2	0.3	0.5	0.2	0.2	0.1	0.3	0.2	NA	NA
W1	NA	-0.3	NA	NA	-0.5	-0.5	-0.5	-0.3	-0.1	0.3	0.0	-0.1	-0.2	-0.4	-0.3	-0.2	0.0	-0.4	-0.2	-0.4	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.4	-0.3	-0.3	-0.3	NA	NA
W2	NA	0.6	NA	NA	-0.3	-0.3	-0.3	-0.2	-0.3	-0.1	-0.2	-0.1	-0.1	-0.2	0.0	0.0	-0.1	-0.3	-0.4	-0.4	-0.3	-0.4	-0.4	-0.3	0.0	-0.3	-0.3	-0.3	-0.3	-0.4	NA	NA
W3 closed	NA	NA	NA	NA	0.1	0.1	0.0	0.1	0.1	NA	0.2	0.2	0.4	0.3	0.1	0.2	0.2	0.2	0.0	0.1	-0.1	-0.1	0.0	-0.1	0.5	0.0	0.0	0.0	0.0	-0.1	NA	NA
S1	NA	-0.2	NA	NA	-0.1	-0.2	-0.2	0.0	0.1	-0.1	0.2	0.0	-0.2	-0.1	NA	-0.2	-0.1	-0.2	0.0	-0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	0.1	0.1	0.1	0.2	NA	NA
S2	NA	-0.2	NA	NA	-0.2	-0.2	-0.1	0.2	0.1	0.0	0.3	0.1	0.1	0.1	NA	0.4	0.1	0.0	0.0	0.1	0.4	0.2	0.0	-0.1	0.1	0.0	-0.1	0.0	0.1	0.1	NA	NA
N1	0.3	0.2	NA	NA	0.1	-0.4	0.4	0.2	0.1	0.3	0.3	0.4	0.4	0.4	0.4	0.6	0.4	0.3	0.2	0.2	0.4	0.3	0.4	0.2	0.5	0.3	0.3	0.2	0.3	0.3	0.3	0.2
159	NA	0.2	NA	NA	0.2	0.2	0.2	0.2	NA	0.2	0.2	0.2	0.1	0.0	NA	0.2	0.2	NA	0.4	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.1	NA	NA
158	NA	0.0	NA	NA	-0.1	0.0	0.2	0.0	NA	0.0	0.0	0.1	0.1	0.2	NA	0.0	0.1	NA	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.2	0.1	0.1	0.1	NA	NA
E Chan	NA	-0.1	NA	NA	0.0	0.6	-0.1	-0.1	-0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.1	0.0	-0.1	-0.1	-0.3	-0.2	-0.2	-0.2	0.0	-0.1	-0.2	-0.1	-0.3	-0.2	0.0	NA	NA
E TW	NA	-0.2	NA	NA	-0.1	0.5	0.0	-0.1	0.1	0.0	0.0	0.1	0.2	0.2	0.2	-0.1	-0.1	-0.1	0.1	-0.1	0.0	-0.1	-0.2	0.0	-0.1	-0.1	-0.2	-0.1	-0.2	-0.3	NA	NA
W Chan	NA	0.0	NA	NA	-0.2	0.3	-0.3	0.0	-0.1	-0.2	-0.1	0.0	-2.4	-0.1	-0.1	0.2	-0.2	-0.1	-0.1	-0.1	-0.1	-0.1	-0.1	-0.2	-0.1	-0.2	-0.3	-0.2	-0.2	-0.2	NA	NA
W TW	NA	-0.2	NA	NA	-0.3	0.6	-0.4	-0.2	-0.1	-0.2	-0.1	0.2	-2.0	0.0	-0.1	-0.2	-0.3	-0.2	-0.2	-0.1	-0.2	0.1	0.0	-0.2	0.0	-0.1	-0.2	-0.3	-0.1	-0.1	NA	NA
S Chan	NA	-0.1	NA	NA	-0.1	-0.3	-0.3	-0.3	-0.1	-0.2	-0.2	-0.3	-0.3	-0.3	NA	-0.2	-0.3	-0.2	-0.1	-0.3	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.3	-0.3	-0.2	-0.2	NA	NA
S TW	NA	-0.2	NA	NA	-0.2	-0.4	-0.5	-0.4	-0.8	-0.1	-0.2	-0.1	-0.7	0.3	NA	-0.5	-0.4	-1.5	-0.4	-0.3	-0.3	-0.5	-0.4	-0.5	-0.5	-0.3	-0.3	-0.5	-0.3	-0.4	NA	NA
N Chan	-0.3	-0.2	NA	NA	-0.1	-0.5	-0.2	-0.1	0.1	-0.1	-0.2	-0.1	-0.2	0.0	-0.3	-0.2	-0.2	-0.2	-0.1	-0.3	-0.2	-0.3	-0.2	-0.2	0.0	-0.3	-0.2	-0.3	-0.1	-0.2	-0.3	-0.2
N TW	0.2	0.8	NA	NA	0.2	0.0	0.2	-0.2	0.0	-0.1	-1.0	0.4	-0.2	0.6	0.1	0.0	-0.3	0.3	0.6	0.1	0.2	0.2	-0.2	0.0	0.1	0.3	0.0	0.1	0.0	0.0	0.2	0.1
E FB	-0.1	NA	NA	NA	-0.1	0.2	0.0	-0.2	NA	0.2	-1.9	0.0	0.0	0.3	0.0	NA	0.0	-0.2	-0.1	0.0	0.4	-0.1	NA	-0.1	0.0	0.0	0.0	0.1	0.1	0.0	NA	NA
N FB	NA	-0.1	NA	0.2	0.0	0.1	0.0	0.2	0.5	NA	-0.1	0.0	0.1	0.1	0.1	NA	0.0	0.1	0.3	-0.1	-0.2	0.1	0.0	0.1	0.0	0.0	-0.1	0.0	0.0	0.0	NA	0.0

AVIAN PREDATION

The three main piscivorous birds observed at The Dalles during juvenile salmonid migration are California gulls (CAGU), double crested cormorants (DCCO) and American white pelicans (AWPE). General increases were seen since ~2000, until the past 2 years.

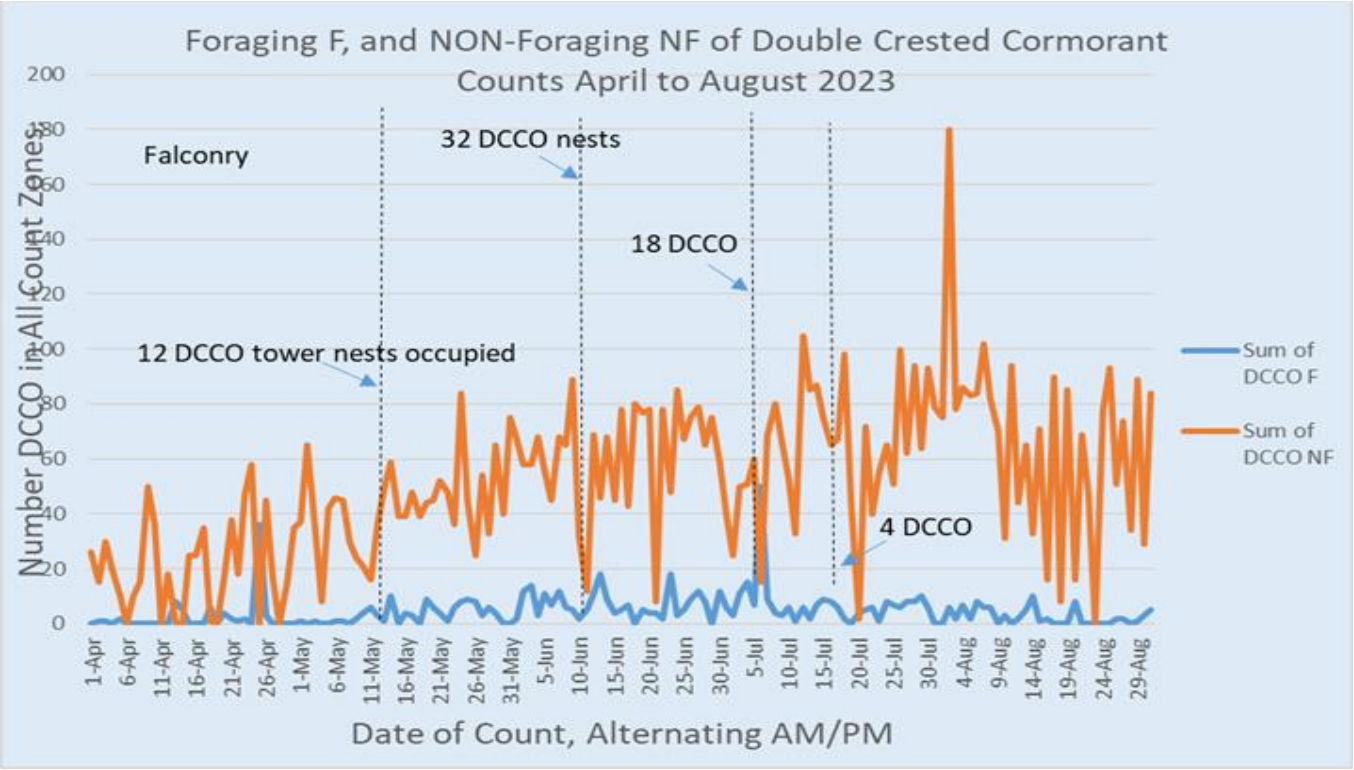
USDA HAZING

The United States Department of Agriculture (USDA) was contracted again to provide avian hazing abatement by boat via pyrotechnics from April 16 – July 31 for gulls and cormorants and a brief period of pelican hazing in late July when permitted. Generally, hazing by boat occurred the first half of the day (8hrs) 7 days a week. USDA did not target pelicans due to lack of authorization until late July. USDA hazers concentrated deterrents in zones upstream and downstream of the US-197 bridge, with brief periods when staff shortage, weather and vessel breakdowns limited hazing efforts.

FALCONS

Contract process began Sept. 2022 to hire falconer to provide early abatement by March. Contracting delays led to falconry abatement starting mid-March thru mid-June. The contractor Avian Solutions, began targeting DCCO, to deter them from nesting on BPA towers at the north Navlock guidewall. Ten days were dedicated to the towers, including falcon, trained dog, bull whip, and other audio deterrents used at the base the tower during daylight hours.

These techniques were initially successful in deterring DCCO from the towers. USACE staff also made regular visits to the base of the towers on foot with air horns to deter DCCO on the towers. These techniques generally caused birds to abandon the towers for up to 12 hours. Efforts stopped when cormorants wouldn't move off the nest, assuming they were on eggs on May 8th. In early April focus changed to gulls around project. The following graphs show possible affect of falconry abatement and other methods. Peak of DCCO nests were reduced by roughly ½ from 2022.



Falconry abatement continued from the peninsula up and downstream of the bridge 8-12 hrs per day for 50 more days, with falconers working east ladder, PH zones and east exit to deter great blue herons, pelicans, gulls and cormorants. Falconry abatement effort was concentrated 3-5 days blocks, with intervals of 2-3 days of no falconry on weekends to allow for falcons/hawks recovery. This is normal practice in falconry abatement. This will be further coordinated with USDA periods of activity and restrictions due to weather or maintenance issues. The contractor, Avian Solutions was also providing falconry at the Miller Rocks colony through contract with Yakama tribes, creating competing schedule commitments. One falcon was lost when it ended up in a well near the navlock. Daily counts during falconry abatement seem to show a significant reduction in gulls, DCCO and pelicans.

RC BOATS

Two brief trials with remote control boats were also tried with promising results This will be further explored for future use. Initial results appear to be a very cost-effective method of deterrence. Further testing is planned for 2024.

TORI LINES

Tori lines were installed for the first time in July to discourage predators from east fishway entrances. Initial results showed very effective deterrence, with almost all Pelicans and Cormorants avoiding the immediate area. This method will be expanded to other areas. Challenges exist with keeping the lines in place during variable flow conditions. Anchor and float modifications will require further testing. Monitoring at east ladder was reduced as passive tori lines, etc. reduced avian presence at fishways.

SOUND SYSTEMS

There are various sound bird deterrent systems on the market. Bird Gard Pro system was purchased and deployed at various locations around project during late fall and winter. There appears to be some deterrence, but further testing is needed.
An audio predator call system was also purchased and will be further tested as it has shown the ability to deter gulls and cormorants near project fishways.

AVIAN (GULL) LINES

Avian lines have been used for decades with mixed results. Effectiveness is dependent on river flows. During high spill, whitewater pushes downstream of the bridge, making the lines upstream of the bridge appear to be very effective. During lower summer spill, whiteware recedes upstream of the bridge and gulls readily pass through the lines. However, the lines covering half of the powerhouse tailrace appear to be extremely effective.

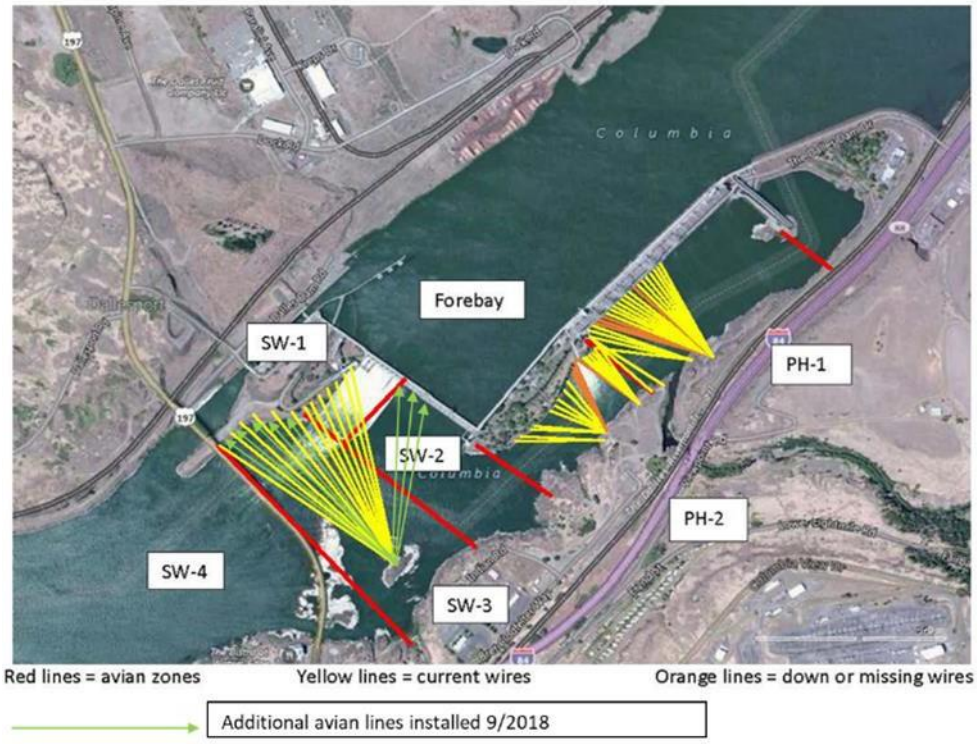
Also lines only show deterrent effect on some gull species. Fixed lines do not deter pelicans, cormorants, mergansers, eagles, grebes and Bonaparte's gulls from feeding. While lines may move gulls away from feeding hotspots, this may only serve to enable pelicans and cormorants to dominate in hotspot feeding areas.

Avian lines are also repaired and maintained as needed, though mylar or other streamers have a short life span and cannot be replaced without removing the lines. See figure for avian line locations. Lines were added (in green) in 2018 for more effectiveness through variable spill ranges but no monitoring of has been done and incidental monitor and daily counts do not show consistent deterrence of gulls.

In addition, partial netting was effectively maintained over a small section of east fishladder weirs downstream of the 180 bend to help deter up to 15 great blue herons during peak of the adult shad run.

LASER

Agrilaser 300mW(handheld laser) use was used infrequently, again in March/April and October, limited to targeting cormorants. Agrilaser use continued during the winter months to deter breeding cormorants from forebay towers. After April 2023 the green laser was ineffective at deterrence and DCCO nesting continued. After June, nests on BPA towers appeared to fledge young but reduced by about ½ from previous year.



TRENDS

Once daily counts were performed by USACE fisheries staff alternating morning and afternoons. In addition, USDA staff performed counts once a day, and generally found more cormorants in certain areas. Inconsistencies in training and methodology limit their use in this analysis. The following graph shows the continued reversal in the GULL daily counts trend during falconry abatement trial of 50 days with 7 days a week boat pyro.

Comparing Previous Year Daily Ave. # of Total Avian Predatorsat The Dalles, Gulls, Cormorants and Pelicans.

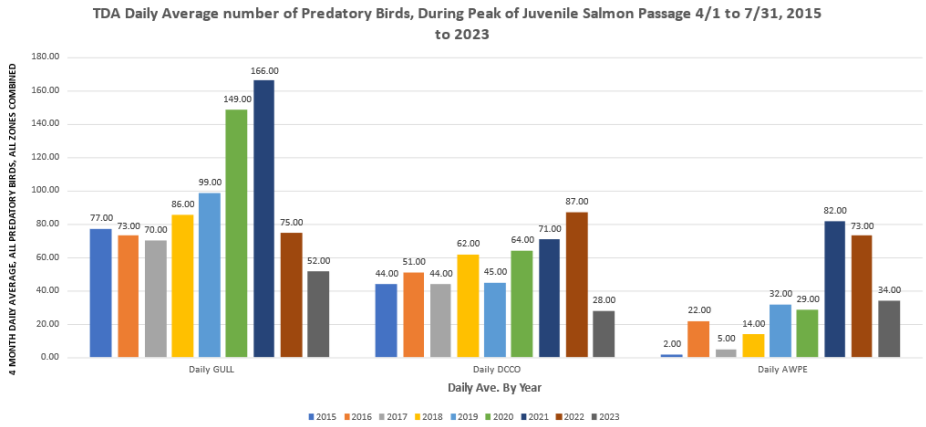


Table above compares average number of three main piscivorous birds counted daily. Deterrent efforts seem to result in a decline in cormorants, gulls and pelicans.

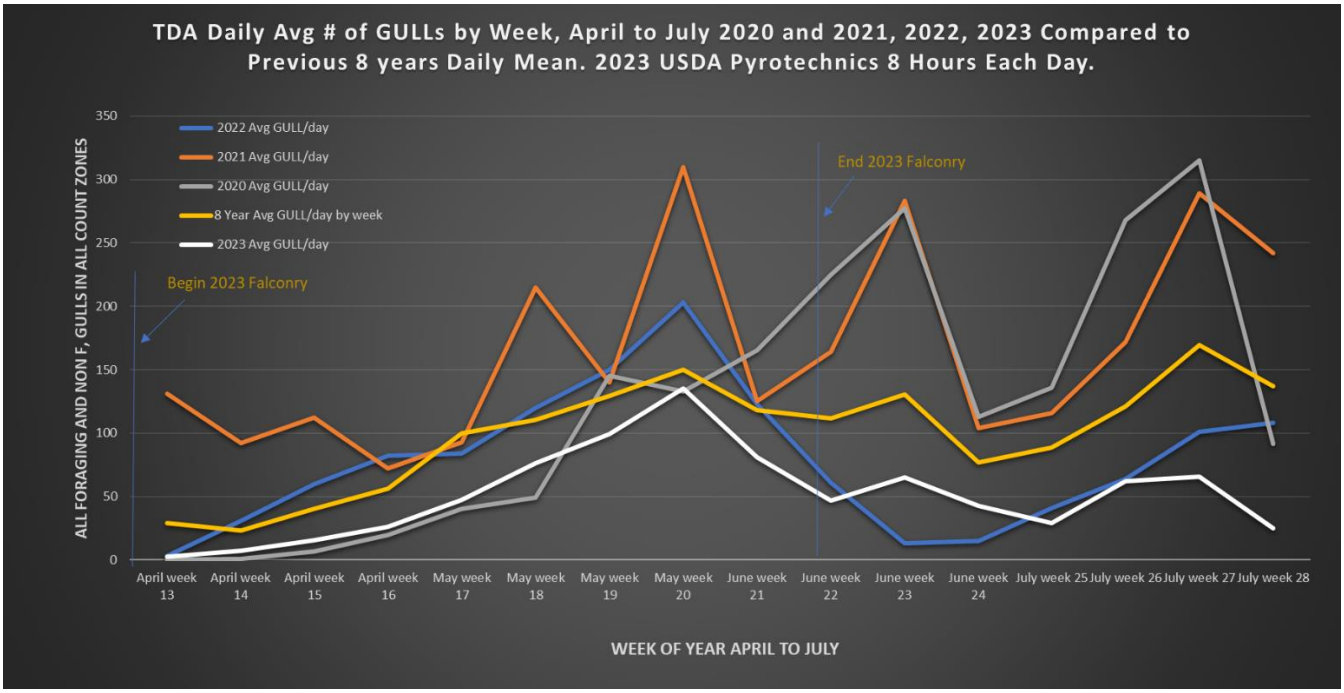


Table shows reduction in gulls during the past 2 years.

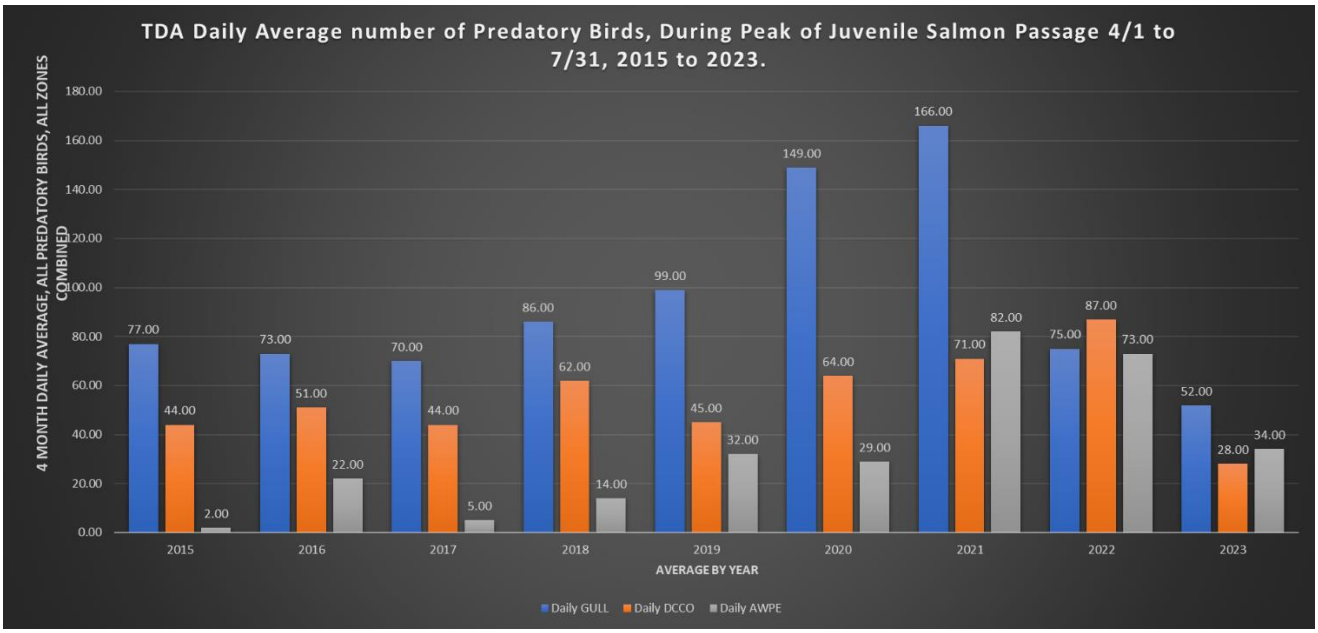


Table reveals a decline in all species.

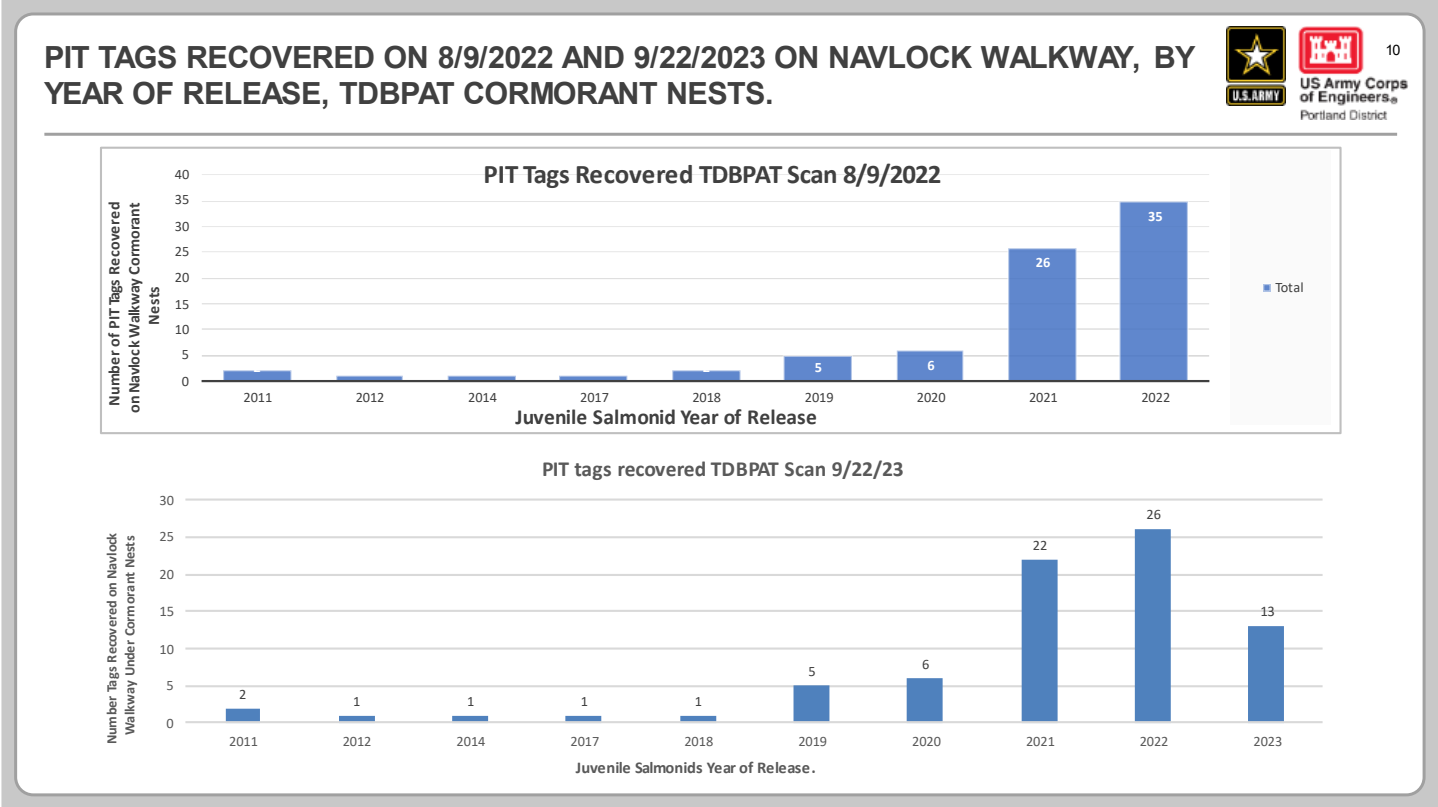
PIT Tag Recovery / Data Upload

To study the impact of predatory birds on juvenile salmon, a biomark PIT tag scanner was used to search areas in SW4, PH1 and within the east fish ladder while de-watered. Areas known to have tags deposited in previous years were searched and few new tags were recovered in 2023. Shoreline areas with resting pelicans and cormorants appeared to have fewer gulls present and in general there were fewer gulls in daily counts in 2023. Indicating that gull are the likely source of PIT tag deposition in most areas aside from TDBPAT (exclusively DCCO).

Further analysis of the tag histories and locations are underway. Ground scans were conducted in late 2020-2023 during east ladder dewatering and in July of 2023 on islands outside of west count zones tailwater. Scanners were again used to search common avian predator resting areas adjacent to feeding areas with sand and rock substrates in June 2023. Tags found on downstream islands (TDALP and TDTMI) were seeded with 50 test tags to measure detection efficiency at known avian predator resting locations. Few new tags were detected, likely result of pyro and falconry displacement of gulls from resting areas.

Two avian colony sites were maintained with the help of PTAGIS staff and Real Time Research. Sites created are (TDALP-Lone Pine Island) and (TDTMI-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 recoveries including tags recovered from small-mouthed bass. Only one new PIT tag was recovered during east ladder dewater in Dec. 2023. 300+ new PIT tags recovered from the heron colony (Avery Park, Brown's Island) in 2021-23 have not been uploaded to ptagis.org but were turned over to ODFW staff for creation of a colony site and data upload. PIT tags were recovered under osprey nest platform near the north count station.

PIT tags were recovered 2 times in 2023 along the walkway leading out to the BPA towers along the north upriver guidewall to the navigation lock. These BPA towers are a known cormorant breeding colony with 65 nest attempts in 2022 reduced to 32 from April to July 2023. The area was scanned again in February and Sept. 2023. Each scan recovered roughly 75 tags with many of them be repeats from previous years, with reduction in breeding related predation evident in fewer tags recovered in fall 2023.



The walkway is only 8’ wide and is bounded by a curb on the south side. A small percentage of the PIT tags migrate out of the nests onto the walkway and then are carried by wind and water into the river bottom. The vast majority of area under the towers is over water and not scannable.

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). The majority of resting birds were cormorants in the forebay (FB) often perched on the forebay transmission towers near the Washington shore and pelicans perched on the rock islands downstream of the bridge (SW4). Daily counts were highly variable, but gulls and cormorants were significantly reduced compared to the 2015 daily average observed during fish passage season (4/1-7/31). California and ring-bill gulls were reduced in numbers from 75 to 52 and few returned to project to feed on immature shad in Nov./Dec. Daily mean number of cormorants decreased from 87 in 2022 to 28 in 2023. We are hoping BPA will remove nest material and/or install Bird Gard audio deterrent to nesting on their towers in 2024.

Pelicans daily mean numbers declined from 82 in 2021 to 34 in 2023 likely due to tori lines and targeted pyro from USDA staff. Other fish-eating birds in small numbers included: great blue herons, grebes, mergansers, osprey and bald eagles. Great blue herons may have some salmonid predation as PIT tag recoveries at nearby Brown's (Rabbit Island) show salmonids taken from nearby tributaries. Grebes were observed in the summer increasing in numbers (5 getting into powerhouse gatewells) 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.report. Monitoring in 2023 intends to evaluate interactions of gull lines and gulls as well as falconry abatement and pyrotechnic deterrence. Efforts are being made to increase the avian abatement success within agency guidelines. Avian lines were maintained, hazing schedule is scrutinized and other means, such as falconry abatement are being pursued. The use of lethal removal at the dam has been approved and is expected to begin on gulls and cormorants in spring 2024.

NEARBY GULL BREEDING COLONY

Little Miller Island, Columbia River, RKM 331 is a well known nesting colony of 5-6000 breeding California gulls and to lesser extent ring-bill gulls located east of Miller Island upstream of the mouth of the Deschutes river. Daily counts of gulls at The Dalles and John Day likely reflect breeding adult numberss from April to June each year. Since 2015, PIT recovery efforts from the island revealed substantial predation on ESA listed salmonid species, a proportion of which come from below The Dalles and John Day Dams. Tribal efforts were made to reduce the number of breeding birds on Miller rocks in March/April 2023. Initiative is underway to repeat this effort in 2024 with the possible addition of adult lethal removal.

Zebra/Quagga Mussel Monitoring

No *Dreissena* mussels were detected during USACE and PSU early detection monitoring throughout the Columbia River Basin in 2023. 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 October to account for the uncertainty associated with predicting mussel spawning and water temperatures. The Dalles staff contributed 10 of the basin wide samples in 2023.**2023 Final Report,** Ashley Newcomb, Catherine de Rivera, and Arick Rouhe Portland State University. During PSU sampling efforts, other non-native invertebrates were detected. These include:

- *Corbicula fluminea*, which was found in the Columbia River (Below Bonneville), Columbia River (Lake Bonneville), Columbia River (Lake Celilo), Columbia River (Lake Umatilla), Columbia River (Lake Wallula), and the John Day River, and
- *Radix auricularia*, which was found in the Columbia River (Below Bonneville), Columbia River (Lake Celilo), Columbia River (Lake Umatilla), and possibly in the Columbia River (Lake Wallula), and
- *Potamopyrgus antipodarum*, which was found in the Columbia River (Lake Celilo)

Waterbody	Site	Date	Type of sample	Invasive invertebrates	Non-concern invertebrates	Invasive plants	Native plants
			Rake point survey; Shoreline survey		*Lymnaeidae* sp.; *Hydrobiidae* sp.		*Elodea canadensis; Potamogeton* sp. poss. *filiformis*
Columbia River, Lake Bonneville, Above Dam	Mayer SP	8/17/23; 8/31/23; 9/1/23	Dock or substrate survey; Rake point survey; Shoreline survey	*Corbicula fluminea*	*Physidae* sp.	Myriophyllum spicatum	*Ceratophyllum demersum; Elodea nuttalli; Heteranthera dubia*
Columbia River, Lake Celilo	Maryhill SP, WA	7/30/23; 9/8/23	Dock or substrate survey; Ponar point survey; Rake point survey; Shoreline survey	*Corbicula fluminea; Radix auricularia; Potamopyrgus antipodarum*	*Planorbidae* sp.; *Trichoptera* sp.; *Physidae* sp.; *Hydrobiidae* sp.; *Lymnaeidae* sp.; *Juga* sp.; *Vorticifex* sp.; poss. *Pisidium* sp.	*Myriophyllum spicatum; Potamogeton crispus*	*Elodea canadensis; Heteranthera dubia; Potamogeton praelongus* or *richardsonii*
Columbia River, Lake Celilo	Rufus Landing	8/18/23; 9/1/23	Ponar point survey; Rake point survey; Shoreline survey	*Corbicula fluminea; Potamopyrgus antipodarum*	*Vorticifex* sp.; *Hydrobiidae* sp.; *Lymnaeidae* sp.; *Gyraulus* sp.	*Myriophyllum spicatum; Potamogeton crispus*	*Potamogeton pectinata; Elodea canadensis; Heteranthera dubia*
			Dock or substrate survey; Rake point		*Vorticifex* sp.;		

Snake River Discovery and Discussion

In September 2023, the Idaho State Department of Agriculture confirmed the presence of invasive quagga mussel in the Snake River near Twin Falls ID. In response, the ISDA used an aggressive emergency approach to eradicate the mussels with a 10-day treatment copper-based chemical Natrix. The pesticide appeared successful. Initial veliger sample results indicated treatment impact on larvae and adult populations alike, it is still early to confirm complete eradication. Sampling and vigilance will continue knowing they are identified in the basin.
Thanks to the Idaho State Department of Agriculture for this information and quick action.

SEA LIONS

No confirmed sightings in tailrace during 2023

Product Development Teams

Backup Auxiliary Water System Debris Management – Installed in 2016 as a backup to the east fish ladder fish unit attraction flow, the AWS experiences problem trash rack plugging when operated. A PDT was developed to determine an alternative to maintaining a clean trashrack during operation. This is especially need when Fish Units undergo rehabilitation, requiring each to be out for a full season. Alternatives reviewed include debris boom barrier, trash rake system, trash rack replacement.

Lamprey Improvements – A Lamprey Passage System installation in the junction pool of the east fish ladder started the winter of 2023/24. This includes a flume to the floor of each side of the channel leading a holding tank under the east ladder. Also included are modified extensions for the entrance weirs to have a plate covering several wall guides allowing lamprey attachment points through higher velocity areas. Onsite maintenance crews also completed lamprey orifices in 154-157 as part of this program.

RESEARCH

The following are a list of fish related research and contract personnel that were on site during the 2023 passage season;

Avian Solutions – Falconry contractor conducted avian abatement.

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

Washington Dept of Fish and Wildlife – Conducted Pikeminnow dam angling primarily from powerhouse tailrace deck.

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.

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 Cooperative 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 boat only 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.

Zebra and Quagga Mussel Monitoring in the Columbia River Basin by the U.S. Army Corps of Engineers and Portland State University 2023 Final Report for *PSMFC Grant 23-150* **2023 Final Report**

END OF REPORT

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