2020 ANNUAL FISHWAY STATUS REPORT

THE DALLES DAM

Date: January 2021
From: Bob Cordie, Jeff Randall, Jim Day

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 2020. 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 2020. 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 30	Dewatered for winter maintenance
Jan 31 -Dec 3	Full operation
Feb 6 – Feb 10	AWS backup open for fish unit breaker replace work
Feb 25	AWS backup system commission test
Dec 3 – Dec 31	Dewatered for winter maintenance. Ladder only, no dewater below tailwater.
Aug 4 AM	Attraction water off for required ROV grating inspection

North Adult Fishway

Jan 1 – Feb 2	Full operation
Feb 3 – Feb 27	Dewatered for winter maintence
Feb 27 – 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	Closed, all gates on seal

DEWATERING FISH SALVAGE DISCUSSION

Efforts are always made to prevent fish mortalities. However, when mortalities occur, procedures are analyzed to determine how to correct for future dewaterings. Three lamprey mortalities were found atop lower east ladder diffuser grating days after the dewatering. Removal of lamprey from below grating is not feasible.

THE DALLES DAM NAVLOCK DEWATERING RESULTS

No Fish were found.

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 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.

THE DALLES DAM FISH LADDER DEWATERING RESULTS

Key; adult=a, juvenile=j, carp=cp, catfish=ca, sculpin=sp, shad=sh, small mouth bass=smb, cr

Date	Event	Chinook	Steelhead	Sockeye	Coho	Lamprey	Shad	Sturgeon	Other	Comments	Morts
12/2/20	E upper	6j	2j		2a		~200	1	1cat	2 sturgeon tagged WDFW	3 lamprey

2/3/20 N upper – missing data

MAINTENANCE ACCOMPLISHMENTS AND PLANS

1) New seals installed on weir 158 to improve crest flow
2) Lamprey attachment plates installed on derelict bulkhead guides near exit weirs.
3) Two expansion joints in east ladder repacked with oakum fiber.
4) New brakes installed east ladder exit 157 weir
5) Diffuser grating gaps found near east entrance during December ROV inspection. Dive repair Jan 2021.
6) 5 of 6 collection channel pumps on deck for repair in 2021.
7) North fishway rock wall reinforcement repair awaiting funding. Budget submission for FY23.
8) Annual vegetation removal from north fish ladder walls continues.
9) New fishway entrance and exit weir automation approx 80% completed. Install of sensors, PLC boxes completed. Completion target Feb 2021.
10) North exit debris boom damaged by high winds. Repair underway for install by Mar 2021.
11) PUD rake system power failed and deemed unsafe. Power alternatives being explored. Temp power to be provided for 2021 operation.

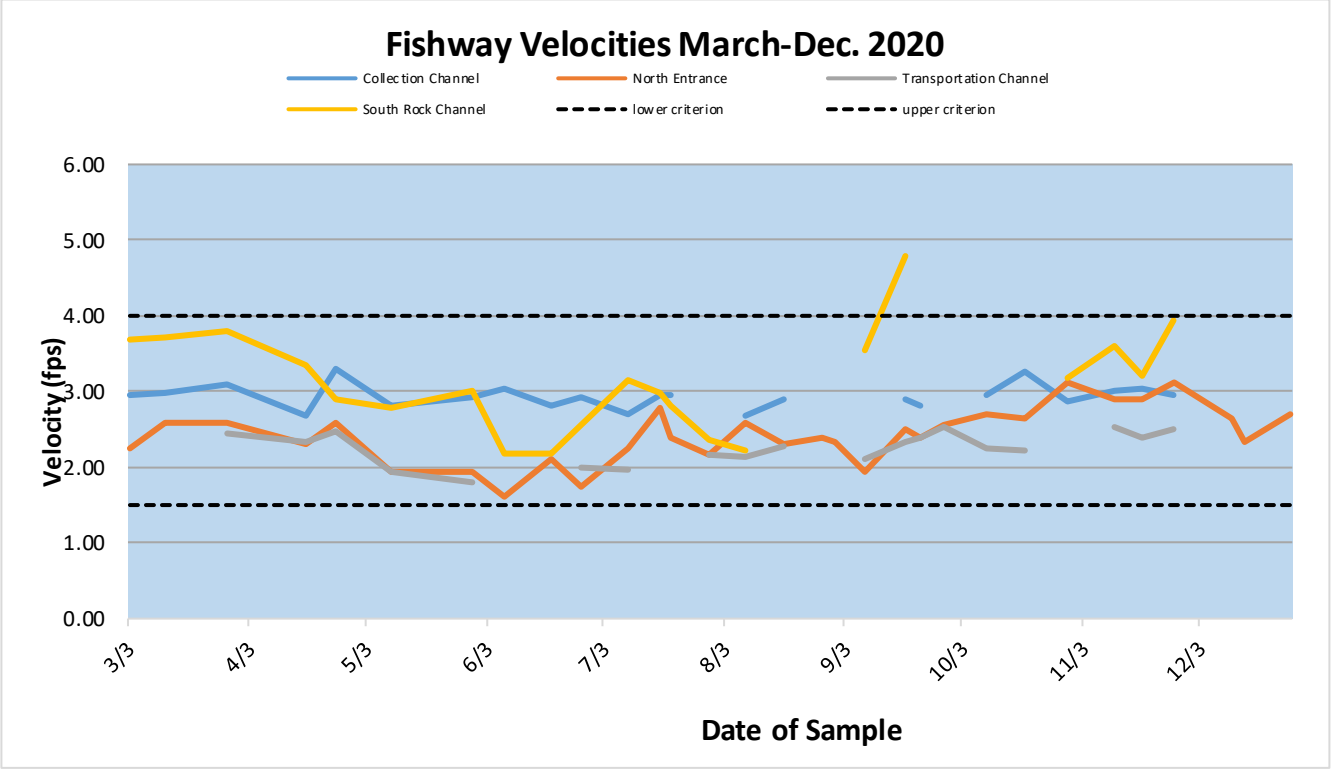
Inspection Criteria Comparison Chart								
	2020		2019		2018		2017	
The Dalles Dam	**Total #**	**%**	**Total #**	**%**	**Total #**	**%**	**Total #**	**%**
Number of inspections	933	100%	882	100%	871	100%	848	100%
NORTH FISHWAY	**out of criteria**		**out of criteria**		**out of criteria**		**out of criteria**	
Exit differential	0	0.0%	0	0%	0	0%	0	0%
Count station differential	0	0.0%	12	1.4%	0	0%	0	0%
Weir crest depth	0	0.0%	2	0.2%	0	0%	0	0%
Entrance differential	0	0.0%	0	0.0%	1	0.1%	3	0%
Entrance weir N1	0	0.0%	0	0.0%	0	0%	6	1%
Entrance weir N2	0	0.0%	0	0.0%	0	0%	1	0%
PUD Intake differential	56	6.0%	17	1.9%	6	0.7%	79	9%
EAST FISHWAY								
Exit differential	0	0.0%	0	0.0%	0	0%	6	1%
Removable weirs 154-157	7	0.8%	39	4.4%	27	3.1%	26	3%
Weir 158-159 differential	19	2.0%	11	1.3%	33	3.8%	10	1%
Count station differential	0	0.0%	0	0.0%	0	0%	10	1%
Weir crest depth	8	0.9%	8	0.9%	15	1.7%	11	1%
Junction pool weir JP6	0	0.0%	0	0.0%	0	0%	4	0%
East entrance differential	10	1.1%	81	9.2%	1	0.1%	20	2%
Entrance weir E1	0	0.0%	7	0.8%	0	0%	4	0%
Entrance weir E2	0	0.0%	65	7.4%	0	0%	21	2%
Entrance weir E3	0	0.0%	59	6.7%	0	0%	9	1%
Collection channel velocity	0	0.0%	1	0.1%	0	0%	0	0%
West entrance differential	9	1.0%	119	13.5%	1	0.1%	7	1%
Entrance weir W1	0	0.0%	113	12.8%	1	0.1%	12	1%
Entrance weir W2	0	0.0%	114	12.9%	5	0.6%	13	2%
Entrance weir W3	0	0.0%	0	0.0%	0	0%	5	1%
South entrance differential	9	1.0%	114	12.2%	1	0.1%	28	3%
Entrance weir S1	0	0.0%	118	13.4%	0	0%	14	2%
Entrance weir S2	6	0.6%	117	13.3%	4	0.5%	5	1%
JUVENILE PASSAGE	0							
Sluicegate operation	13	1.4%	7	0.8%	11	1.3%	10	1%
Turbine trashrack drawdown	0	0.0%	0	0.0%	0	0%	0	0%
Spill volume	0	0.0%	0	0.0%	0	0%	148	17%
Spill Pattern	1	0.1%	0	0.0%	0	0%	97	11%
Turbine Unit Priority	215	23.0%	187	21.2%	30	3.4%	266	31%
Turbine 1% Efficiency	0	0.0%		0.1%	3	0.3%	8	1%

Inspection Discussion

Overall improvement in most areas. Increase of PUD intake differential OOC due to rake failure. Increase in turbine unit priority
Due to Covid-19 restrictions no fisheries staff entered the powerhouse control room to collect spill data or other GDACs informa

WATER VELOCITY

Fishway channel water velocities were measured weekly during Adult Fish Passage Season (Mar 1 - Dec 31). Floats were timed through all f
report. Criteria velocities of 1.5 to 4 fps were generally maintained throughout the fish passage season, with a few intances of velocities >4
Velocity is generally slower from junction pool to unit 21. Past University of Idaho analysis did not reveal fish passage delays in this area.
this time of year in the south channel.



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 deb
dams in that gatewell drawdown measurements have not been found out of criteria, nor has gatewell debris been a problem. However the Fish
during passage season. Gatwell orifices are being permanently closed due to the absence of screens and conservation of water. This is don
checked twice yearly per Fish Passage Plan, for debris accumulation.

WATER QUALITY

Water clarity was read by secchi dish at the count stations. Water clarity data is not included in this report due to its questionable accuracy, bu status reports. Additional monitoring will be done to determine differences from upper to lower ladder. The following graph is a compilation of the count stations and the lower entrance area of each ladder. Lower Columbia River Temperature Report

CALIBRATION

Calibration (comparing digital display and staff gauge readings vs tape measure or laser) checks on all water level stillwells and weirs 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. In 2020 the reduced activity on project minimized work adjacent to east ladder, while TDE installed new SCADA automation at entrances/exits. Requests for maintenance by TDE to adjust calibrations were made as needed, but routine work while doing automation installations at entrances helped keep gates in criteria.

	3/3/20	3/10/20	3/24/20	4/3/20	4/6/20	4/13/20	4/23/20	4/30/20	5/6/20	5/15/20	5/18/20	5/26/20	6/5/20	6/18/20	6/24/20	6/29/20	7/8/20	7/18/20	7/29/20	8/7/20	8/17/20	8/28/20	9/1/20	9/8/20	9/16/20	9/22/20	9/28/20	10/7/20	10/13/20	10/29/20	11/10/20	11/18/20	11/26/20	12/12/20	12/26/20
1 no criter	0.8	1.5	1.05	0.8	0.8	1	0.9	0.8	1.2	1	0.95	1	0.83	0.4	0.2	1	1.35	1	0.91	1.1	1.6	1.1	1.3	1.2	1.1	1.2	0.7	1.35	1.2	0.9	1.1	0.8	0.8		
E2	0.3	0.1	0.3	0.3	0.3	0.2	0.2	0.1	0.1	-0.3	0.05	0.1	-0.3	-0.1	0.1	0	0.27	0.3	0.3	0.3	0.3	0.1	0.25	0.2	0.2	0.2	0.2	0.25	0.1	0.2	0.2	0.1	0.1		
E3	0.4	0.2	0.3	0.3	0.3	0.3	0.3	0.2	0.2	-0.2	0.05	0.1	-0.1	0.2	0.1	0.1	0.3	0.3	0.5	0.3	0.3	0.2	0.3	0.3	0.2	0.2	0.3	0.3	0.2	0.1	0.2	0.3	0.3		
W1	0.12	0.12	0.07	-0.03	-0.03	0.12	0.12	0.12	0.12	-0.18	-0.25	-0.08	-0.18	-0.28	-0.28	-0.18	0.22	0.12	0.12	0.22	0.22	0.12	0.22	0.22	0.12	0.32	0.07	0.22	0.12	0.02	0.12	0.12	0.12		
W2	-0.28	0.12	-0.18	-0.28	-0.28	-0.18	-0.18	-0.08	-0.18	-0.48	-0.53	-0.28	-0.63	-0.08	-0.08	0.02	0.12	0.12	0.22	0.22	0.12	0.22	0.12	0.12	-0.03	0.32	0.32	0.12	0.22	0.22	0.17	0.22	0.12		
W3 closed	0.12	0.02	0.02	0.02	0.02	0.02	0.09	0.02	0.02	0.02	0.12	-0.18	0.02	0.02	0.12	-0.08	0.22	0.12	0.07	0.12	0.22	0.12	0.17	0.02	0.12	0.02	0.12	-0.08	-0.08	-0.08	-0.08	0.02	0.02		
S1	0.2	0	-0.15	-0.3	-0.3	-0.2	-0.3	-0.3	-0.1	-0.6	-0.3	-0.1	-0.4	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.2	-0.25	-0.25	-0.2	-0.2	-0.25	-0.5	-0.2	-0.2	-0.2	-0.2	-0.25	-0.2	-0.2		
S2	0.9	0.9	0.7	0.2	0.2	0.5	-0.25	-0.3	-0.3	-0.5	-0.3	-0.1	-0.5	-0.3	-0.3	-0.3	-0.1	-0.3	-0.3	-0.3	-0.3	-0.25	-0.1	-0.2	-0.15	-0.1	-0.2	-0.1	-0.3	-0.3	-0.25	-0.3	-0.4		
N1	-0.01	-0.3	na	-0.27	-0.27	-0.25	0.1		-0.18	0.23	0.27	0.3	0.2	0.24	-0.1	0.25	0.3	0.25	0.1	0.11	0.07	-0.2	0.29	0.25	0.24	0.34	0.23	0.2	null	-0.05	null	0.15	0.15	0.25	0.1
159	**0.3**	**0.1**	**0**	**-0.1**	**0**	**-0.1**	**0**	**-0.1**	**-0.1**	**0**	**0**	**0**	**-0.1**	**-0.1**	**-0.1**	**-0.1**	**0**	**0**	**0.1**	**0**	**0**	**0**	**null**	**0**	**0**	**0**	**-0.1**	**-0.1**	**null**	**0**	**0.1**	**0.1**	**0.1**		
158	**0.3**	**0.1**	**-0.3**	**-0.3**	**-0.3**	**-0.3**	**-0.3**	**0.1**	**0**	**0.6**	**0**	**0**	**0**	**0**	**0.1**	**0**	**0**	**0**	**0.1**	**0.1**	**0.1**	**0.1**	**null**	**0**	**0.8**	**0.4**	**0**	**-0.1**	**null**	**-0.1**	**-0.1**	**-0.1**	**-0.1**		
E Chan	0.1	0.3	-0.1	-0.3	0	0	0.1	0.2	0.3	0.5	0.3	0.3	0.3	0.3	0.3	0.4	0	-0.2	-0.2	-0.1	-0.05	0.1	-0.05	0.1	-0.2	-0.03	0.2	-0.05	0.2	-0.3	0	-0.2	-0.2		
E TW	-0.5	0.15	-0.2	0	0	0	-0.2	0.1	0.35	0.3	0.1	0.1	0	0.3	0.1	0.3	-0.1	0	-0.1	-0.3	0	0.2	-0.1	0.3	-0.1	0.1	-0.2	-0.1	0	-0.03	0	-0.3	-0.3		
W Chan	0.3	0.1	-0.1	0	0.2	0.1	0.1	0.1	0.2	0.3	0.3	0.35	0.3	0.3	0.25	0.2	0	0.1	0.2	0.15	0	0.2	0.1	0.1	0.2	0	-0.1	0.1	0.1	0	0.15	0.1	-0.05		
W TW	0.1	-0.2	-0.1	0.2	0.1	-0.1	-0.1	-0.1	0.05	-0.5	-0.3	-0.2	-0.3	-0.3	-0.3	-0.3	0	-0.2	-0.99	-0.2	-0.15	0	0	0	-0.1	-0.2	-0.2	0	-0.1	0.1	null	-0.2	-0.2		
S Chan	0.1	-0.1	0.1	0.1	0.15	-0.2	-0.2	-0.3	-0.3	-0.2	-0.2	-0.2	-0.3	0	0	-0.3	-0.2	-0.2	-0.2	-0.2	-0.3	-0.2	-0.2	-0.2	-0.2	-0.13	-0.1	-0.25	-0.1	-0.1	-0.1	-0.1	-0.1		
S TW	0	0	0.2	0.15	0.1	-0.1	-0.1	-0.1			0.8	-0.2	-0.2	0.3	0	0.5	0.3	0	0.1	0.2	-0.1	-0.2	0.3	0.2	0.2	0.4	null	0.3	0.2	0.15	0.1	0	0.1		
N Chan	0	0	0	0.1	0	0	-0.15		-0.2	0.21	0	-0.09	-0.1	0.06	-0.06	0.3	-0.2	-0.1	-0.11	-0.2	-0.08	-0.1	-0.23	-0.22	-0.3	-0.21	-0.3	-0.2	null	-0.5	null	-0.21	-0.21	-0.18	-0.3
N TW	0	0	0	0	0	0	-0.19		0.06	-0.22	0.1	0.3	-0.3	-0.34	-0.33	-0.1	0.6	null	0.2	0	-0.06	-0.2	0.26	0.06	0	-0.08	0.4	0.05	null	-0.12	null	-0.12	0.08	0.14	0.1
E FB	-0.2	-0.2	0.3	-0.2	-0.2	-0.2	-0.2	0	-0.2	-0.2	-0.2	-0.2		-0.2	-0.2	-0.2		0.2	-0.2	-0.2	-0.2	-0.3	null	-0.2	-0.2	-0.2	-2	-0.3	null	-0.1	-0.1	-0.1	null	null	null
N FB	-0.2	0.1	0	0.2	0.2	0.1	0.1		-0.2	0.2	0.2	0.2		0.3				0.2	0.2	0.2	0.1	0.1	null	0.1	0.1	0.1	0	0.2	null	0	0.2	0.2	null	0.2	0.3
Tech.	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED	JED

Note: blue color indicates errors caused by environmental conditions.

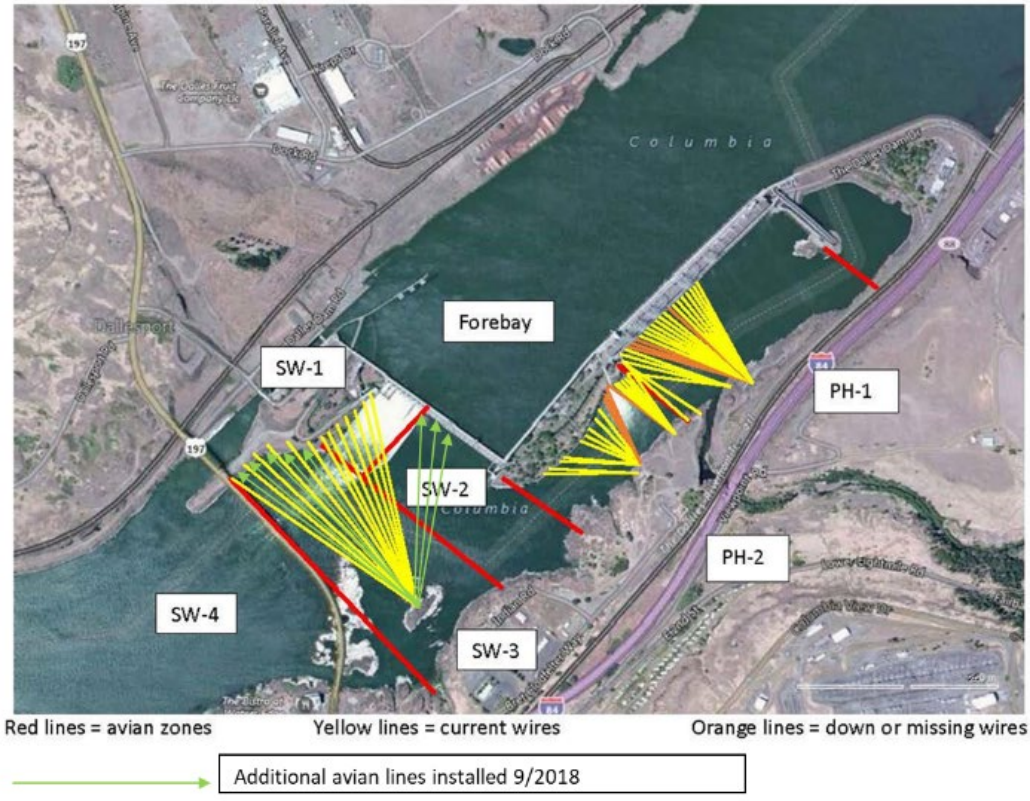
CALIBRATION DISCUSSION

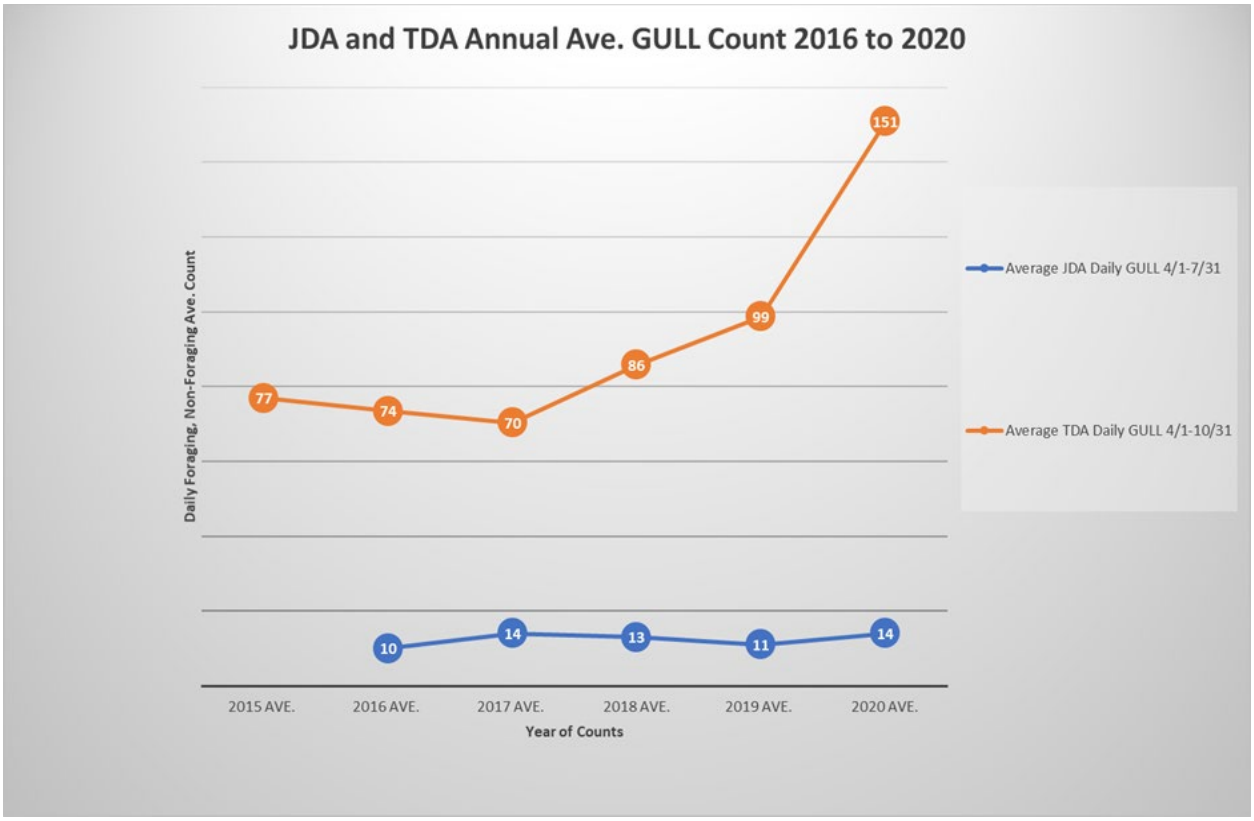
Out of calibration readings that require maintenance are indicated by highlight. Out of calibration that was likely the result of high tailwater, wind or other environmental factor was highlighted. 2020 had 16 out of calibration records. 2019 had 46 out of calibration readings during the fish passage season. 2018 had 63 out of calibration events, less than 2017 results which were much higher than prior years with 127. This is compared to; 2016=32, 2015=24, 2014=22 and 2013=28. Allowances were made for out of calibrations gates so that at no times would entrances be out of criteria > 8' openings. Maintenance was notified for needed adjustments as soon as possible and constant attention by TDE staff to entrance gates likely led to frequent adjustments on their part as they installed the new automated Vega sensors. Fisheries staff did calibrations on all weeks. New automation system installed during 2020/2021 for north and east fishway entrances and exits. New automation will be active in early 2021 and fisheries staff will standardize procedures with TDE as old sensors, PLC, and SCADA platforms are decommissioned. This should reduce the number of calibration issues in coming years.

AVIAN PREDATOR ABATEMENT

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.

Avian lines are also installed and maintained where feasible. See figure below for avian line locations. Lines were added (in green) in 2018 for more effectiveness through variable spill ranges. This will be monitored for predation changes.

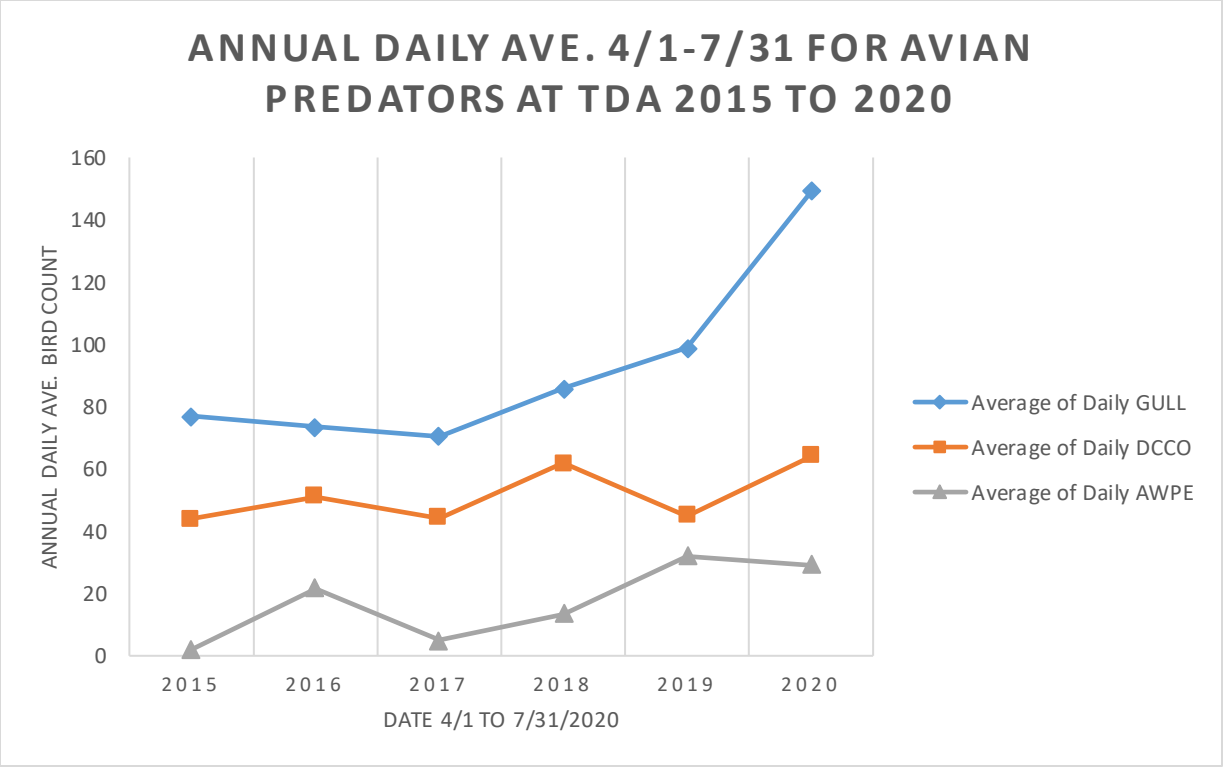




Comparison of JDA GULL annual daily average compared with GULL annual average at The Dalles. Significant increase in GULL average at TDA in 2020. Discussions were initiated to examine the reasons for the disproportionate growth in GULL numbers at TDA while numbers remain stable at the JDA. Factors considered are voids in avian lines at TDA, access to alternate food sources in TDA, secure resting locations at TDA and reduced numbers of GULL predators at TDA.

The table below compares the average number of the three key salmon predator birds at the Dalles counted in daily zones alternating AM and PM counts. While cormorants and pelicans seem to have leveled off in the last couple of years the numbers of gulls (california and ring-billed) have continued to rise dramatically. A biomark PIT tag scanner was borrowed from FFU in December and used to search areas in SW4, SW3, PH1 and within the east fish ladder while de-watered. Numerous tags were detected (roughly 200 total in all areas) and those near the east count PIT array were removed from the ladder. Further analysis of the tag histories and locations are underway.

(4/1-10/31)	Daily GULL	Daily DCCO	Daily AWPE
2015 average	76.91	44.00	1.98
2016 average	73.51	51.14	21.73
2017 average	70.40	44.37	4.82
2018 average	85.84	61.76	13.55
2019 average	98.76	44.82	31.92
2020 average	147.82	63.26	29.32



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). Gulls foraged heavily in this zone. The majority of resting birds were cormorants in the forebay (FB) often perched on the electrical transmission towers near the Washington shore and pelicans perched on the rock islands downstream of the bridge (SW4). Daily counts were highly variable, but compared to the 2015 daily average observed during fish passage season (4/1-10/31), mean gull and cormorant numbers are within the normal range (98.76 and 44.82, respectively; normal range: 11-142 for gulls, 7-80 for cormorants), but pelicans are showing increasing numbers (2019 mean = 31.92; normal range: 0-10). Normal ranges are calculated as the 2015 mean (the earliest year for which we have complete data) ± standard deviation. Compared to 2018, daily averages during passage season increased 15% for gulls and 136% for pelicans, but decreased 27% for cormorants. Other birds included grebes, mergansers, and eagles. Grebes were observed in the summer along with pelicans 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.

WHERE ARE ALL THOSE GULLS COMING FROM?

Miller Island is a well known nesting colony of primarily California Gulls and to lesser extent Ringbill Gulls. Recent PIT 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 green laser are being tested. The use of lethal removal at the dam continues to be requested by project.

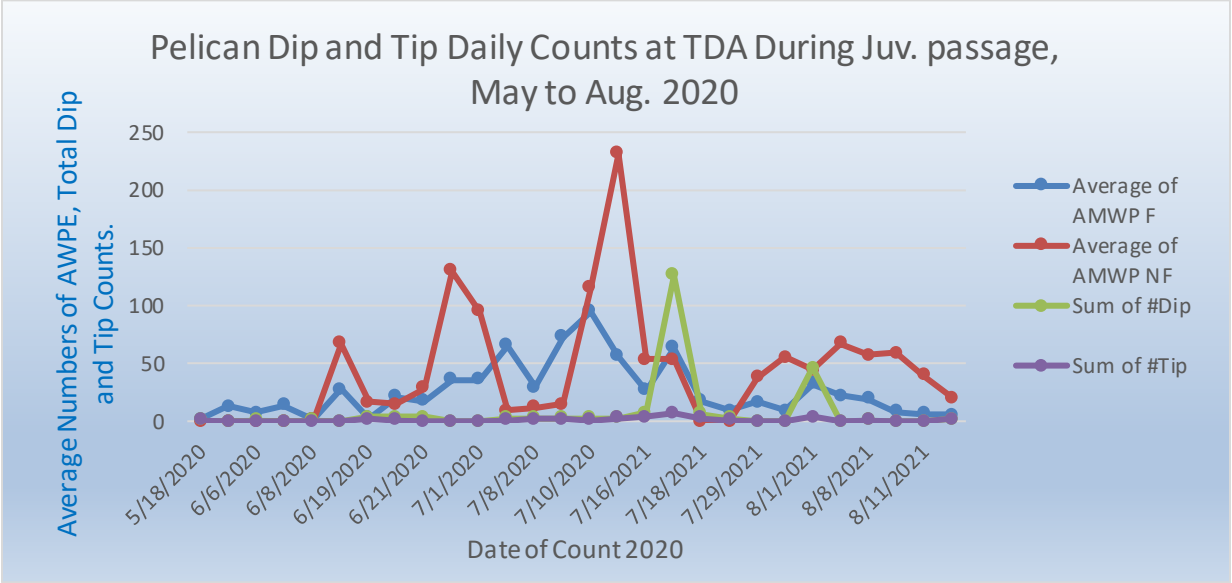
Discussion of Trigger point; application of standard deviation 2015-2019 baseline GULL count.
Using April to July as the key active hazing period we examined the last 5 years of GULL counts to determine a standard deviation for 2015 to 2019, 79.95 GULL/day. The proposal is that a daily count in excess of 50% of GULL 5 year average would result in activation of more aggressive hazing techniques.

Daily Counts	Daily GULL 4/1/2020-7/31/20	All year GULL
2015 St. Dev.	69.33	122
2016 St. Dev.	76.86	74.4
2017 St. Dev.	86.49	95.5
2018 St. Dev.	100.07	138
2019 St. Dev.	66.99	168.18
2020 St. Dev.	125.52	66.5
Average 2015-2019	79.95	119.62

Pelicans Dip and Tip Counts, What are they eating?

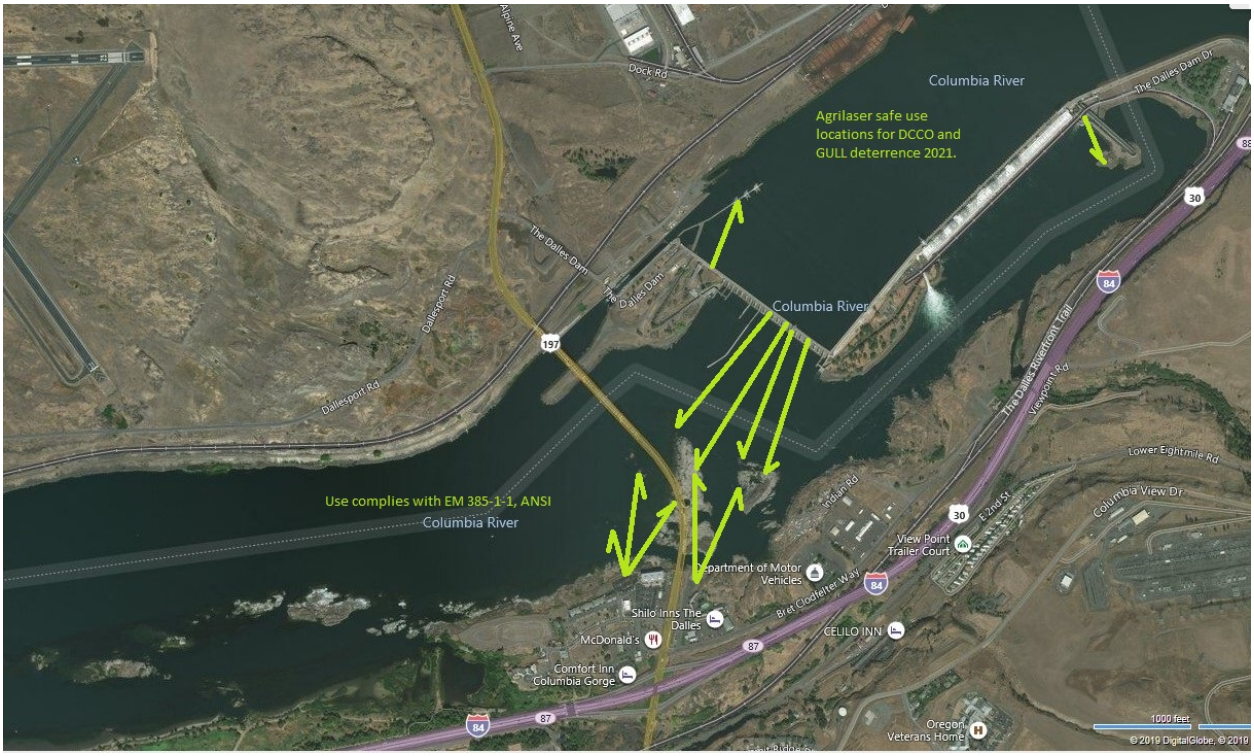
Total numbers of American White Pelicans (AWPE) have steadily increased. In an effort to determine Pelican prey, dip and tip counts were taken in 2019 and 2020. Observations and data indicate AWPE are likely targeting adult shad mortality during most of the juvenile salmon passage season. Its possible that pelicans may not pose a significant threat to salmon. Further diet sampling by wildlife managers (not Corps of Engineers) is needed for diet confirmation. PIT tags of juvenile salmon were found in 2020 on rocks occupied during salmon passage in areas shared by GULL, AWPE and DCCO.

Observations of AWPE dip and tips were conducted from June to mid August of 2020. There was very little feeding observed, unlike 2019. Incidents of kleptoparasitic attack on DCCO and GULL increased dramatically. These attacks did not seem to be successful for the most part during observations. The daily numbers of AWPE fluctuated widely with total numbers for season similar to last year. Shad fallback was not available to AWPE as in previous years.



FURTHER DISCUSSION OF AGRILASER USE

Beginning in Jan. 2019 a demonstration use of a green light 500mW Agrilaser was begun focusing on hazing resting GULLs and Comorants (DCCO) at the Dalles dam. For various reasons this appears to have had limited effect on GULL with migratory birds quickly returning to project areas after Agrilaser use. Beginning in Sept. 2019 a more systematic approach to hazing GULL and DCCO was applied though the end of the year. In early 2020 the use of the Agrilaser was halted while safety concerns and the development of a the Laser safety program were completed. Jim Day obtained the Laser Safety Officer qualification (Deputy LSO Bob Cordie) to meet COE EM-385 1-1 requirement and other federal standards for safe use. Agrilaser use was begun again in October, 2020 limited to targeting DCCO. The numbers of GULL(Pyro and Agrilaser hazed) and AWPE(not hazed) continued to increase. Agrilaser use is continuing during the winter months 2020/2021 to deter breeding DCCO from nesting on forebay powerline towers.



FISH COUNTING

Visual fish counting was conducted 4/1/20 to 10/31/20 by Four Peaks Environmental and Science & Data Solutions. Counts were downloaded to the FPC website http://www.fpc.org/adults/Q_coeadultqueryforms.php.

Zebra/Quagga Mussel Monitoring

4 mussel samples were collected in 2020.

No *Dreissena* mussels were detected during USACE and PSU early detection monitoring throughout the Columbia River Basin in 2020. 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 samples of the 82 basin wide samples in 2020.
2020 Final Report, Steve Wells, Aquaticus LLC Rich Miller, Catherine de Rivera, and Mark Sytsma Portland State University

SEA LIONS

No sightings in tailrace during 2020.

RESEARCH

The following are a list of fish related research and contract personnel that were on site during the 2019 passage season;

4 Peaks – New 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.

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. CTUIR worked with the Nez Perce and Yakama Nation to help with lamprey collection efforts. Yakama Nation was allocated 209, 189 for Nez Perce and 196 for CTUIR.
END OF REPORT
Approved by; Ron Twiner, Operations Project Manager, The Dalles Dam