2017 ANNUAL FISHWAY STATUS REPORT

THE DALLES DAM

Date: Jan, 2018
From: Bob Cordie and Jeff Randall

INTRODUCTION

The Dalles Dam has specific 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 downstream steelhead kelt and juvenile fish passage. In addition Northern Wasco Co PUD has a turbine that supplies auxiliary water to the north fishway, which has a complete juvenile bypass system. Information on this systems operation can be acquired through Pacific States Marine Fish Commission monitoring report. The following document is a summary of all fish related activities that occurred at The Dalles Dam in 2017.

FISHWAY OPERATING SCHEDULE

The following information includes fish passage system operation for calendar year 2017. Total length of time for annual fishway outages can be determined by referring to previous years' annual reports. The fishways are closed and dewatered for maintenance once each winter between Dec1-Feb28. Attempts are made to prevent both fishways being out simultaneously. However construction of the auxiliary wtaer system backup for the east fishway required the full 3 month period. Therefore the north ladder outage was reduced to 2 weeks with minimal maintenance work.

East Adult Fishway

Jan 1 – Mar 6 Dewatered for winter maintenance
Mar 7 – Nov 31 In full operation with attraction water
Aug 8 Attraction water off half day for required ROV grating inspection
Dec 1 – Dec 31 Dewatered for winter maintenance

North Adult Fishway

Jan 1 – Jan 2 In full operation with attraction water
Jan 3 – Jan 17 Dewatered for annual maintence
Jan 18 – Dec 31 In full operation with attraction water
Aug 8 Attraction water off half day for required ROV grating inspection

Ice/Trash Sluiceway (Juvenile)

Jan 1- Feb 28 End gate closed
Mar 1 – Mar 31 In service with 4 sluice gates open
Apr 1 – Dec 2 In service with 6 sluice gates open
Dec 3 – Dec 14 In service with 4 sluice gates open
Dec 15 – Dec 17 Sluicegates closed, endgates failed open
Dec 18 – Dec 31 End gate closed

Spillway

Jan 1 – April 9 Closed, all gates on seal
April 10 – Aug 31 Spill 40%, 24/7 for juvenile passage
Sept 1 – Dec 31 Closed, all gates on seal

FISHWAY 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. Five lamprey mortalities were found under south entrance diffuser grating. A gap along upstream wall was identified and corrected. Three lamprey mortalities were found pinched between weir leafs. No preventable solution was determined. Two lamprey mortalities were found elsewhere in the fishway several days later. Their source was not determined.

DEWATERING FISH SALVAGE

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, time limitation, 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 need visual inspection and cannot be dewatered are inspected by ROV underwater camera.

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THE DALLES DAM FISH LADDER DEWATERING RESULTS

Key; adult=a, juvenile=j, carp=cp, catfish=ca, sculpin=sp, shad=sh, small mouth bass=smb, crappie=cr, pikeminnow=pm, whitefish=wf, redside=rs, large scale sucker=lss

Date	Event	Chinook	Steelhead	Sockeye	Coho	Lamprey	Shad	Sturgeon	Other	Comments	Morts
1/4/17	N ladder	0	2a	0	0	22	0	0	0	Skip lower	0
12/1/17	E ladder	1a	3a, 42j	0	0	5	~300	0	0	none	0
12/4/17	E below tailwater	1a	0	0	0	85	~20	14	3cp	none	10 lamprey

NAVLOCK DEWATERING RESULTS

No Fish were found.

FISHWAY INSPECTION RESULTS AND COMPARISON

Two complete visual fishway inspections are conducted per day during the adult fish passage season (March 1 to November 30). One fishway inspection is conducted per day during the non- passage season. A monitor is installed in the fisheries office showing real time and 24hour information of the operation of east entrances, east ladder and north ladder. This information is recorded as a third inspection. Equipment calibration, gatewell inspection and drawdown's are also part of the inspection program. Guidelines are provided by the COE Fish Passage Plan. Weekly fishway status reports are provided to fish managers throughout the year. Status information is also provided at monthly Fish Passage Operation and Maintenance meetings. Comparisons are made with prior 2 years to track how equipment has been performing. The following are fishway inspection results;

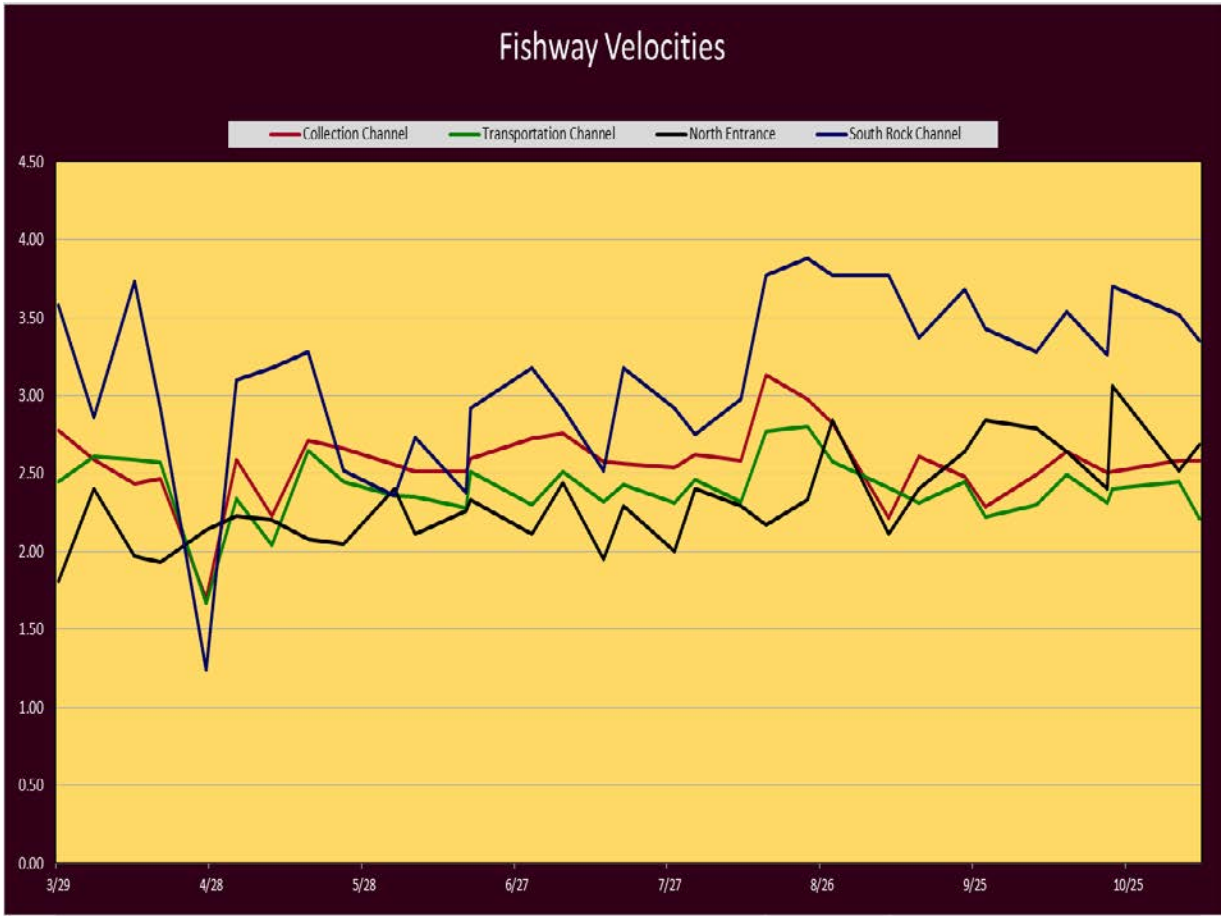
Inspection Criteria Comparison Chart						
	2017		2016		2015	
The Dalles Dam	Total # out of criteria	%	Total	%	Total #	% OOC
Number of inspections	848		918		899	
NORTH FISHWAY	0	0%	0	0.0%	0	0.0%
Exit differential	0	0%	0	0.0%	0	0.0%
Count station differential	0	0%	0	0.0%	0	0.0%
Weir crest depth	0	0%	24	2.6%	26	2.9%
Entrance differential	3	0%	3	0.3%	4	0.4%
Entrance weir N1	6	1%	2	0.2%	1	0.1%
Entrance weir N2	1	0%	0	0.0%	0	0.0%
PUD Intake differential	79	9%	15	1.6%	5	0.6%
EAST FISHWAY						
Exit differential	6	1%	1	0.1%	1	0.1%
Removable weirs 154-157	26	3%	31	3.4%	18	2.0%
Weir 158-159 differential	10	1%	28	3.1%	20	2.2%
Count station differential	10	1%	5	0.5%	6	0.7%
Weir crest depth	11	1%	1	0.1%	3	0.3%
Junction pool weir JP6	4	0%	4	0.4%	1	0.1%
East entrance differential	20	2%	8	0.9%	8	0.9%
Entrance weir E1	4	0%	1	0.1%	0	0.0%
Entrance weir E2	21	2%	17	1.9%	55	6.1%
Entrance weir E3	9	1%	7	0.8%	2	0.2%
Collection channel velocity	0	0%	1	0.1%	0	0.0%
West entrance differential	7	1%	3	0.3%	4	0.4%
Entrance weir W1	12	1%	4	0.4%	4	0.4%
Entrance weir W2	13	2%	15	1.6%	46	5.1%
Entrance weir W3	5	1%	1	0.1%	0	0.0%
South entrance differential	28	3%	7	0.8%	5	0.6%
Entrance weir S1	14	2%	18	2.0%	50	5.6%
Entrance weir S2	5	1%	3	0.3%	9	1.0%
JUVENILE PASSAGE						
Sluicegate operation	10	1%	15	1.6%	8	0.9%
Turbine trashrack drawdown	0	0%	0	0.0%	0	0.0%
Spill volume	148	17%	7	0.8%	1	0.1%
Spill Pattern	97	11%	1	0.1%	0	0.0%
Turbine Unit Priority	266	31%	180	19.6%	45	5.0%
Turbine 1% Efficiency	8	1%	1	0.1%	0	0.0%

INSPECTION DISCUSSION

1. The PUD intake differential criteria was higher than previous years due to the rehab work ont eh PUD rake. The conventional mobile crane rake was used as a backup, but not adequate in cleaning the trashrack. There were no apparent negative affects to juvenile fish condtion in the Pacific States Marine Fish Commission weekly samples during that time period. Nor did it affect auxiliary water supply to the north fishway.
2. Spill criteria was out due to the large river flow volume.
3. Turbine unit priority was affected by outages and maintenance actiivities. Unit 15 and 16 remain forced out due to transformer failure affecting the block loading sequence.
4. All other areas were within 97% criteria compliance.

MAINTENANCE ACCOMPLISHMENTS AND PLANS

1) All entrance weirs, functioning diffusers and count station equipment inspected.
2) All entrance weir composite wheel replacement of existing stainless steel wheels to be completed during 2016/17 outage. Rehab entrance weir lifting beams maintained as needed.
3) A diffuser valve on east end of collection channel will be permanently closed and operating equipment removed. This will determine level of labor needed to do the same for the remaining 52 collection channel diffusers. Diffusers for junction pool (6), lower east ladder (15) and east entrance (6) will remain permanently open with equipment removed. South and west entrance diffusers will remain operable.
4) North count station window brush replaced with adjustments for better window cleaning.
5) East exit weirs 155, 156 and 158 gearbox seals and couplers to be replaced. Weirs 154 and 157 to be completed in upcoming years.
6) One of 2 stuck collection channel dewater pumps to be removed and repaired. Remaining 4 collection channel pumps, and 4 entrance area pumps are maintained and operable.
7) East exit power source FCQ7 panel replacement 50% complete. Final design to be completed for end of this outage. Work to complete installation Feb 2018.
8) North fishway rock wall reinforcement repair alternatives developed through district Product Development Team. Construction dates pending funding.
9) Some vegetation removal from north ladder walls completed. More aggressive removal planned next year with longer outage time.
10) Fishway entrance and exit weir automation upgrade planning underway. Some updated equipement on hand.
11) Avian line shock hazard assessment to be completed 2018. Will also attempt to reduce gaps between lines for improved effectiveness.



WATER VELOCITY DISCUSSION

Fishway channel water velocities were measured weekly during Adult Fish Passage Season (Mar1 – Dec 1). 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 maintained throughout the fish passage season. Velocities were not always taken at unit 22 due to turbulence preventing float tracking. Velocity is generally slower from junction pool to unit 21, however past University of Idaho analysis did not reveal fish passage delays in this area.

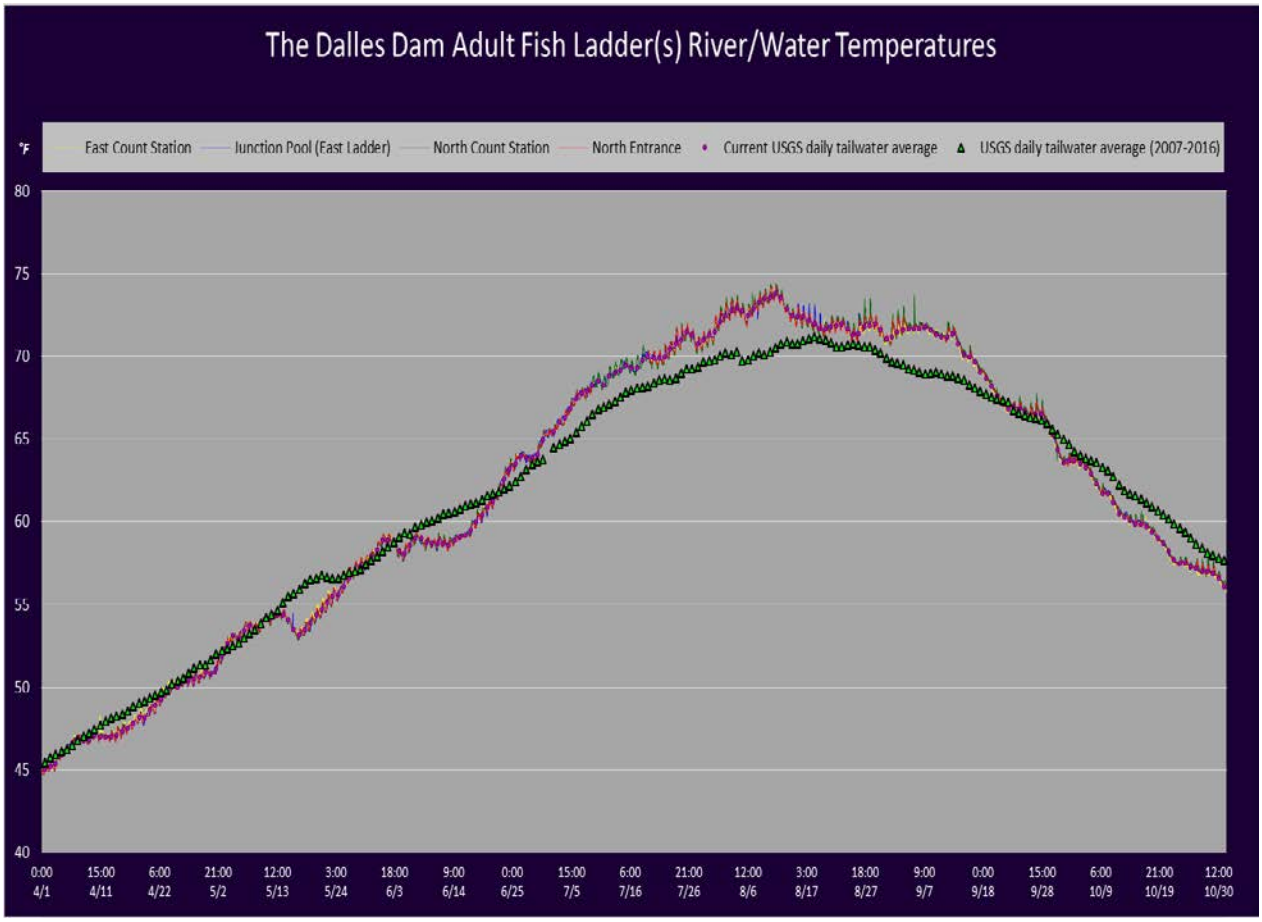
GATEWELL AND TRASHRACK MONITORING

Gatewell drawdowns are a measurement of water level between forebay and gatewell used to determine turbine intake trashrack debris loads and are checked weekly. As in previous years, all maintained well within the criteria limit (+ or – 0.5'). Gatewell drawdown measurements have not been found out of criteria for past 20+ years, nor has gatewell debris been a problem.

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, but can be obtained on request. Temperature monitoring with data loggers in each fishway is provided biweekly in the fishway status reports. Additional monitoring will be done to determine differences from upper to lower ladder. 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.



FISHWAY EQUIPMENT CALIBRATION

Calibration (comparing digital display and staff gauge readings vs tape measure) checks on all water level stillwells and weirs done weekly to assure accuracy. Maintenance is notified when they are found off by more than 0.3'. Human error and weather conditions is factored into the results.

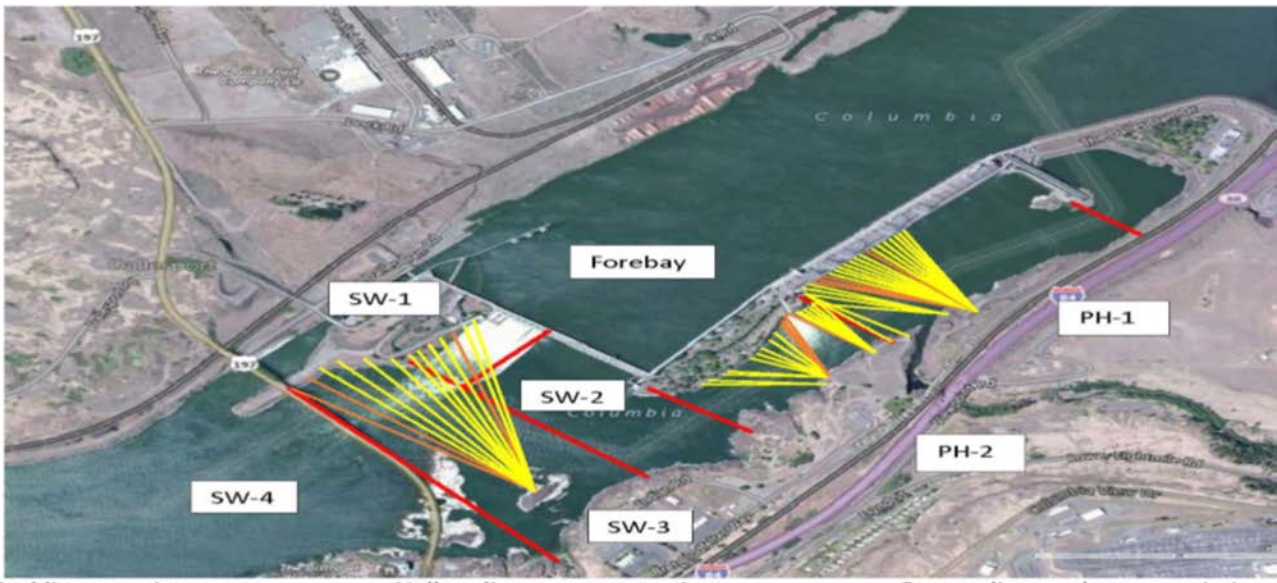
Location		3/14	3/25	3/28	4/4	4/6	4/12	4/21	4/25	7/1	7/5	7/15	7/17	7/27	8/10	8/17	8/28	9/6	9/26	10/13	11/4	11/7
East ladder entrance weirs	E1	-0.8	-2.3	-0.1	-0.4		-0.8	-0.6	-0.7	1.0	-0.4	-0.4	-0.6	-0.6	-0.3	-0.4	-0.4	0.6	0.3	0.5	0.5	-1.3
	E2	-1.2	-2.7	-0.1	0.0		-0.2	0.2	0.0	0.3	0.9	0.9	0.7	0.7	0.7	0.9	0.7	1.0	-0.1	-0.1	-0.1	0.1
	E3	0.0	-1.5	-0.3	0.0		-0.2	0.1	-0.1	0.2	0.6	0.6	0.5	0.5	0.6	0.8	0.7	1.2	0.1	0	0.7	0
	W1	-0.1								0.4	0.6	0.6	0.8	0.8	0.4	0.8	0.7	0.8	0.6	0.6	0.6	0.8
	W2	-0.3	-0.3	0.1	-0.1	-0.2	-0.3	-0.3	-0.2	-0.2	0.0	0.0	0.1	0.1	0.3	0.0	0.5	0.2	0.0	0.3	0.3	-0.2
	W3		-0.2	0.1	0.0	-0.1	-0.2	-0.2	-0.1	-1.2												0.1
	S1	0.1	0.6	-0.4	-0.1	-0.2	0.0	-0.1	-0.9	0.2	0.1	0.1	0.0	0.0	0.3		1.8	0.3	0.3	0	0.0	-0.3
	S2	-0.2	-0.6	-0.7	-0.3	-0.8	0.3	0.2	0.4	0.2	1.4	1.4	1.4	1.4	1.4		0.8	0.2	0.1	0	0.0	0.1
East ladder channel-tailwater	E Chan	0.5	-0.8	0.5	0.4	0.7	-0.3	-0.1	-0.3	-0.3	-1.5	-1.5	-0.8	-0.8	-1.6	-1.5	-1.9	-0.1	-0.1	-0.4	0.1	-0.6
	E TW	0.1	-0.6	0.9	0.7	0.7	-0.1	-0.1	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.5	0.4	-0.4	-1.0	-0.4	-0.1	-0.1	-0.8
	W Chan	0.5	-0.9	0.9	0.6	0.5	0.1	0.0	-0.7	0.1	-0.1	-0.1	-0.1	-0.1	-0.5	-0.3	-0.4	-0.1	0.0	-0.1	-0.1	0.0
	W TW	-0.2	-1.8	0.2	0.0	0.1	0.0	-0.5	-0.7	0.1	0.1	0.1	0.0	0.0	0.2	0.2	0.2	-0.2	0.3	-0.1	-0.1	0.2
	S Chan	6.1	4.2	0.0	-0.2	-0.2	0.1	-0.1	-0.2		-0.3	-0.3	-0.6	-0.6	-0.1		-0.1	1.8	-0.2	-0.8	-0.8	-0.4
	S TW	5.7	4.2	-0.2	-1.4		0.1				0.1	0.1	-0.2	-0.2	-0.5		-0.3	-1.5	0.0	-0.7	-0.7	-0.2
East ladder exit wiers	159	0.1	0.1	-0.2	-0.3	-0.2	-0.3	-0.3	0.0		-0.3	-0.3	-0.4	-0.4	-0.3	-0.2	-0.2	-0.3	-0.2	-0.1	-0.1	0.0
	158	-0.7	-0.2	-0.3	-0.3	-0.2	-0.3	-0.2	0.0		-0.3	-0.3	-0.3	-0.3	-0.3	-0.1	-0.1	-0.3	-0.1	-0.1	-0.1	-0.1
Forebay	E FB																					
	N FB																					
North ladder	N1	0.2	-0.1	0.1	0.1	0.2	0.1	0.1	-0.2		0.7	0.3	0.2	0.2	0.2		0.3	-0.1	0.3	0.1	0.1	0.2
	N Chan	-0.1	-0.3	-0.2	0.7	0.1	-0.2	0.0	0.0		0.4	-0.1	0.0	0.0	-0.4		-0.5	-0.4	-0.3	-0.2	-0.2	-0.7
	N TW	-0.2	-0.3	-0.2							1.2	0.0	-0.2	-0.2	-0.1		-0.2	-0.3	-0.5	-0.4	-0.4	-0.5

CALIBRATION DISCUSSION

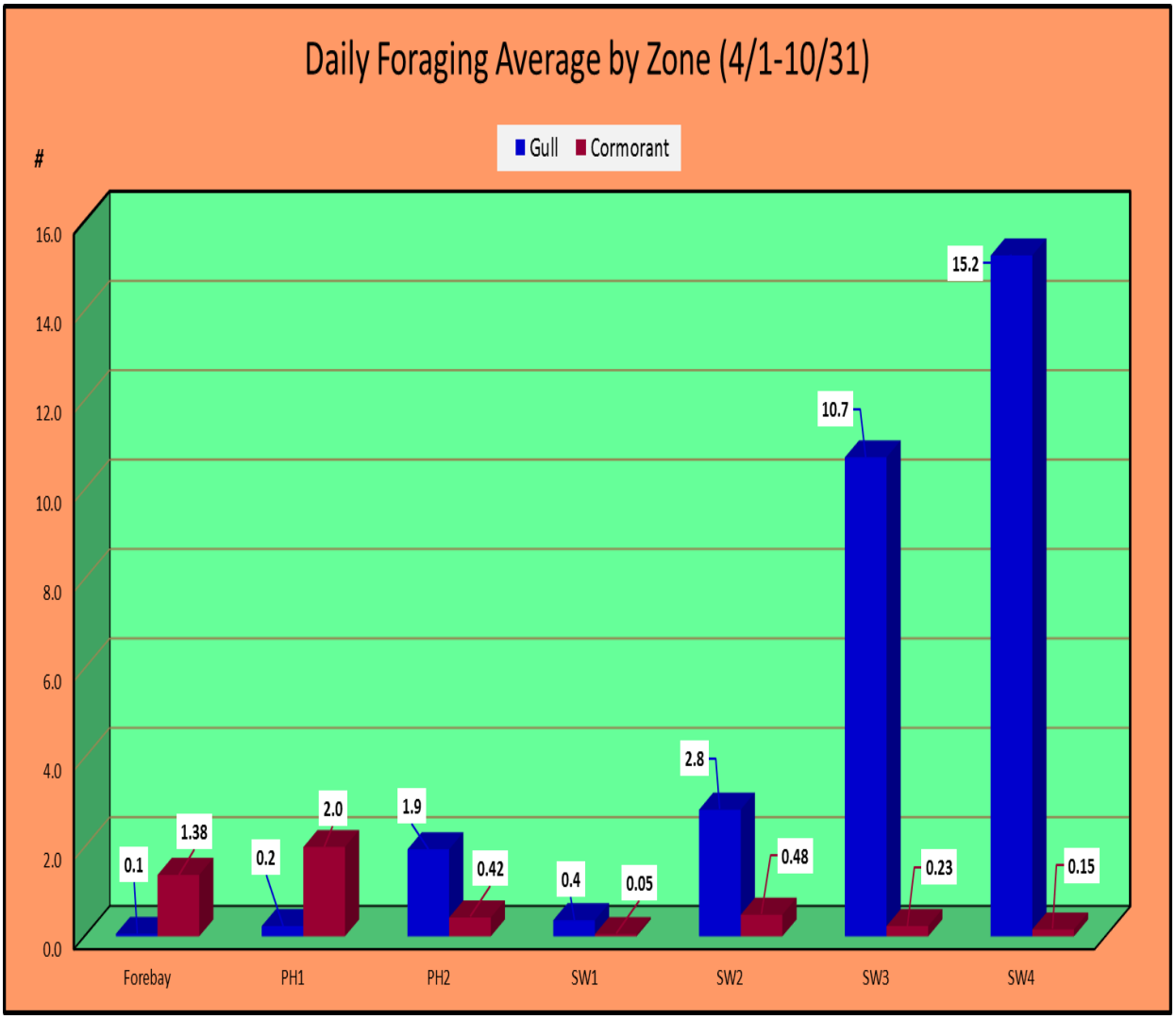
Calibration readings out of criteria are indicated by highlight. 2017 results were much higher than prior years with 127 readings out of criteria compared to; 2016=32, 2015=24, 2014=22 and 2013=28. Some of the data accuracy is in question due to obvious good entrance flow conditions. Maintenance was notified for needed adjustments. Plans are underway for full automation replacement which should improve accuracy and reliability. We will also take a closer look at calibration procedures for accuracy.

AVIAN PREDATION ABATEMENT

The United States Department of Agriculture (USDA) is contracted to install avian lines as needed. The map shows observation zones and avian line locations. Spillway broken lines were replace fall 2017. The line array that was over the east half of powerhouse tailrace was removed due to induced voltage creating safety hazard.



USDA is also contracted to haze gulls Apr15 – July31 during all daylight hours (0600-2000hrs). Hazing is done from a boat downstream of bridge (SW4) the first 8 hours, then from land on the navlock peninsula the remaining 6 hours per day. There were periods of time in which hazers could not use pyrotechniques due to barges and/or heavy wind days. Modifications to the USDA 2018 plan include more boat hazing efforts during the spring outmigration peak period.



AVIAN OBSERVATION 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). Therefore most of the hazing efforts occur in this zone due to the concentration of gulls. Double crested cormorants were primarily in the forebay (FB1) perched on the electrical transmission towers near the Washington shore and would tend to dispurse away from dam during the day. Pelicans show up mid summer and forage on the eddy line downstream of the spillwall. Grebes were observed in the summer and fall in forebay but not in close proximity to the dam. Mergansers were observed primarily in fall and winter downstream of the powerhouse 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 to eagle foraging from avian lines. (Ref; Fisheries Field Unit "Evaluation of Interaction Between Overwintering Bald Eagles and the Avian Line Array at The Dalles Dam 2013").

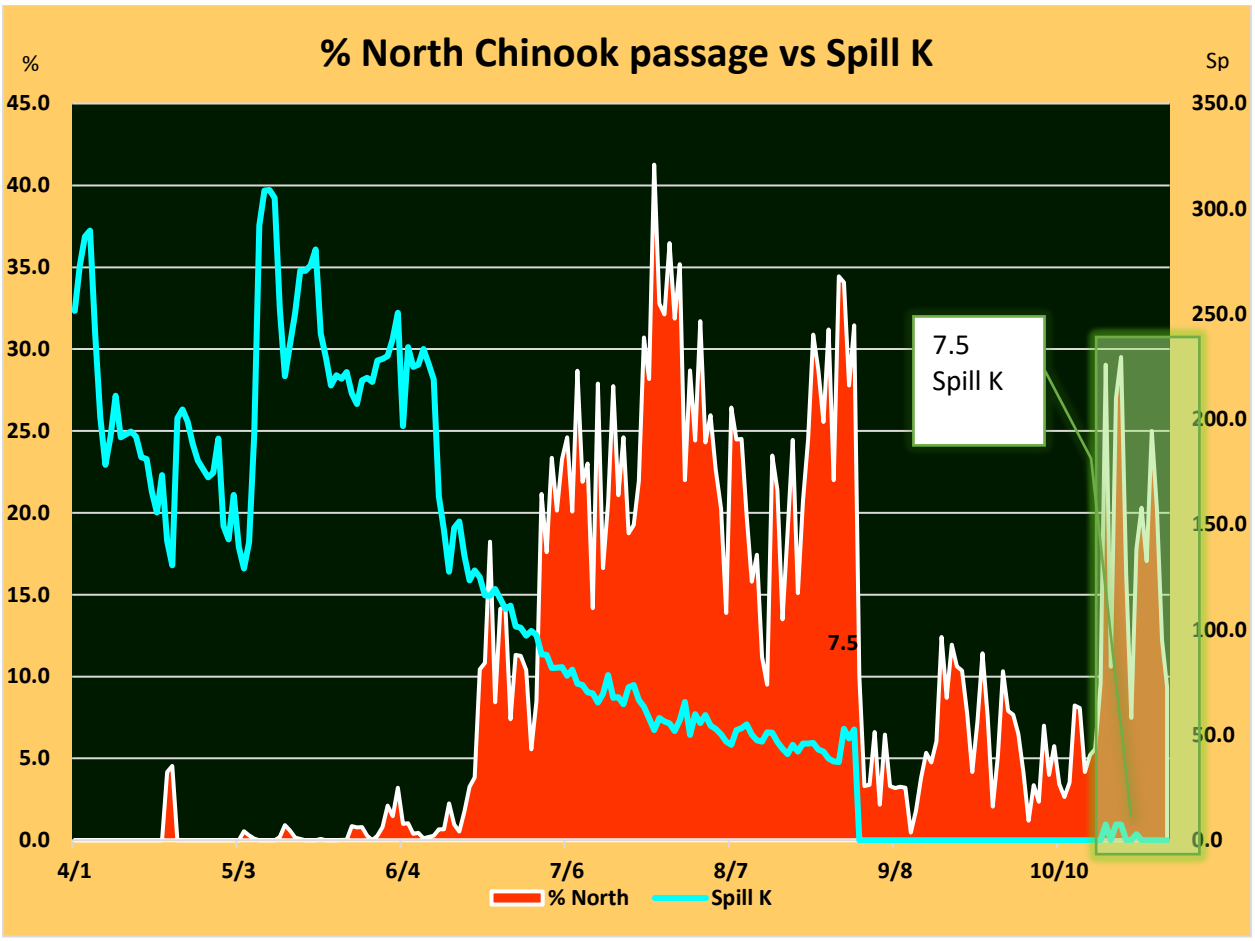
MILLER ISLAND DISCUSSION

Concern has been raised from the high numbers of PIT tags that research has recovered from the Miller Island Gull colony. The results show a high percentage estimate from known ESA listed

stocks. (Ref; Grant County PUD/Priest Rapids Coordinating Committee, Evaluation of Foraging Behavior, Dispersal, and Predation on ESA-listed Salmonids by Caspian Terns Displaced from Managed Colonies in the Columbia Plateau Region). "Consumption rates of smolts by gulls nesting on Miller Rocks are some of the highest observed for any piscivorous waterbird colony in the Columbia Plateau region since system-wide, multiple avian predator studies were first initiated in 2007"
It is well known that these gulls forage at The Dalles and John Day dams. This puts into question the effectiveness of the present gull predation abatement efforts. This information has been shared with regional fish managers through Fish Passage Operation and Maintenance forum and Insland Avian Predation Workgroup forum. Efforts are being made to improve abatement effectiveness at the dam. This includes the possibilty of using limited lethal removal of gulls at Portland district projects, similar to what is effectively used in Walla Walla district and Grant Co PUD projects.
All indications are that Miller Island rocks is not owned by Corps. Therefore if management efforts are to be applied to the nesting colony is the responsibility of another agency.

NORTH LADDER PASSAGE VS SPILL

Spill operation has been documented to affect north fishladder passage in the past several years. In previous years spill >110KCFS tended to block salmonids from entering the north ladder. During late April and early May, this trend is apparent. It was again clearly demonstrated that with no spill, salmonids are not attracted to the north entrance area either; hence the drop in north passage immediately after spill stops. A contigency spill was executed 10/18, 10/21 and 10/22 with a spill KCFS of 7.5 appears to have given a spike in North passage.



SEA LIONS

There continues to be frequent california sea lions sightings in the tailrace. No sightings have been made inside the fishways to date, but several have been in close proximity to entrances. The following is a log of all the sea lion sightings in 2017.

1/28/17	1322	SL	swimming	culdesac
2/23/17	1300	SL	swimming	culdesac
3/9/17	1100	SL	swimming	east entrance
4/5/17	1330	SL	east salmon	east entrance - ID not visible
4/14/17	1030	SL	swimming	West entrance-roving guard
4/18/17	1400	SL	swimming	20 feet from east entrance
4/19/17	942	SL	swimming	east entrance- 1-31 is back
4/20/17	1024	SL	swimming	east entrance- 1-31 is back
4/21/17	1100	SL	swimming	east entrance- 1-31 is back
4/21/17	1115	SL	eating salmon	east entrance- CO14
4/22/17	1245	SL	swimming	east entrance- CO14
4/22/17	1315	SL	swimming	MU9 PH- 1-31
4/25/17	1005	SL	swimming	east entrance- 1-31
4/25/17	1330	SL	swimming	east entrance- ID unknown (not 1-31 or CO14) hazed by USDA

4/25/17	1345	SL	swimming	east entrance- C014
4/26/17	1130	SL	swimming	east entrance- 1-31
4/27/17	930	SL	eating salmon	east entrance- 1-31
5/2/17	1300	SL	eating salmon	east entrance- 1-31
5/3/17	1230	SL	swimming	east entrance- 1-31 hazed by USDA
5/3/17	1245	SL	swimming	west entrance- C014 hazed by USDA
5/6/17	1230	SL	eating salmon	east entrance- 1-31 hazed by USDA
5/8/17	1137	SL	eating salmon	sluiceway- C014
5/8/17	1645	SL	eating salmon	sluiceway- ID not confirmed, swimming with C014
5/8/17	1655	SL	swimming	east entrance- 1-31
5/9/17	945	SL	swimming	Powerhouse- ID not confirmed
5/18/17	1125	SL	swimming	Powerhouse- ID not confirmed
9/20/17	845	SL	swimming	I-97 bridge- ID not confirmed
9/25/17	1000	SL	eating shad	west entrance- no id confirmed
12/2/17	1000	SL	swimming	east entrance
12/17/17	1000	SL	eating salmon	culdesac

FISH COUNTING

Visual fish counting was conducted 4/1/17 to 10/31/17 by Normandeau Environmental Consultants contract. Counts were downloaded to the FPC website. Video counting was performed during the off season. Refer to Corps of Engineers 'Annual Fish Passage Report' 2017 for fish count and comparison to previous years. A video counting test continues to be investigated by Fish Field Unit for the north count station. This will include use of latest video/computer technology for improved visability and more efficient/accurate fish counting. Testing is scheduled to continue next passage season.

PIKEMINNOW ABATEMENT

Washington Dept Fish and Wildlife conducted hook and line dam-angling in support of the on-going BPA funded Columbia River Predator Control Program Dam angling from May through Oct 8, in conjunction with ODFW and PSMFC. A total of 1,776 northern pikeminnow >230mm were caught at The Dalles Dam. Most angling occurred from powerhouse tailrace. A large increase in walleye by catch was reported this year. The concern of catch and releasing a non native predator ahs been raised through FPOM.

ZEBRA/QUAGGA MUSSEL MONITORING

Zebra mussel veliger sampling was conducted once in August via plankton tow. Sample sent to Portland State University's Center for Lakes and Reservoirs for analysis. No mussels found to date. Program will continue in 2017.

RESEARCH

The following are a list of fish related research and contract personnel that were on site during the 2017 passage season.

Confederated Tribes of the Umatilla Indian Reservation – 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. CTUIR captured 208 lamprey by Aug 22.

Normandeau Environmental Consultants – Continued to perform fish counting 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 4th to August 17th via pyrotechnics during juvenile passage season.

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

Yakama Nation - Captured adult Pacific lamprey as part of the on-going project to restore lamprey to various tributaries. Yakama Nation worked with the Nez Perce and CTUIR to help with lamprey collection efforts. Yakama Nation captured 219 lamprey by Sept 16.

Removal of derelict equipment attached at the powerhouse main unit intakes not completed this year and is not scheduled until 2018.

REPORT DRAFTED BY:

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