

OFFICIAL COORDINATION REQUEST FOR NON-ROUTINE OPERATIONS AND MAINTENANCE

COORDINATION TITLE- 14 IHR 010 Unit 3 blade welding to reduce oil discharge

COORDINATION DATE- November 6, 2014

PROJECT- Ice Harbor

RESPONSE DATE- November 13, 2014

Description of the problem

COE NWW is assembling a plan to fix the turbine blades on Unit 3 until the runner is scheduled for replacement in 2017 - 2018. Unit 3 consistently leaks oil and this will no longer occur once the blades are welded into a fixed position. The unit 3 blades will be welded within the 1% turbine efficiency operating range as specified in the FPP. Project would like to start ASAP to get this work underway and completed prior to February 2015 when digital governor work has been previously scheduled.

COE is wanting to coordinate this blade welding decision with Regional Fishery Managers prior to undertaking the work. Unit 3 operates within the range of 8,518 – 13,547 cfs depending on project head. Unit 2 already has blades welded and operates between 11,105 – 11,869 cfs depending on project head, with blades fixed at roughly 22°.

As part of the turbine survival program back in 2007, balloon tagged yearling Chinook were released to better understand survival and condition after turbine passage. Results from that study suggest that setting the blade angle in a position between peak and the upper 1% of turbine efficiency should assure the highest passage survival. During the biological test, this point a 23 degree blade angle at just over 96 ft of head. There was a slight gradient in the 48 hour survival measurements (point estimate +/- SE) between the A slot (.96 +/- .02); B slot (.98 +/- .014); and C slot (.99 +/- .10) of unit 3.

Operating at 23 degree blade angle is additionally supported by extensive ERDC evaluation that was completed as part of the Ice Harbor turbine replacement design process. Of four operating points tested on the existing runner across the operating range, the 23 degree blade angle had the least amount of bead strike and direction change for mid blade passage. While the hub passage was not as good as the upper 1% operating point, most of the fish are expected to pass near the mid blade when fish screens are installed.

Additional information that was evaluated was ERDC evaluation information on stay vane and draft tube passage as well as 2005 sensor fish data. Increased discharge would improve both stay vane and draft tube passage based on ERDC information; however the risk of barotrauma related mortality would increase at the highest operating points as indicated by the sensor fish data. These opposing trends would support that the optimum operating point for the existing turbine would be an intermediate point. This information is described in more detail in the Turbine Survival Program Phase II report.

COE requests review of their proposed action to weld Unit 3 blades at a 23° angle, which best corresponds to the 2007 biological test results. Based on preliminary information from HDC the table below indicates the existing discharge and power 1% operating range at 96 ft of head for Unit 1 and Unit 2 as well as the estimated operating range of Unit 3 welded at 23 degrees. The actual operating range of a fixed Unit 3 will be determined from an index test during startup of the unit following the repair.

Operating Range for Units 1 – 3 with STS installed at 96 ft of Head

Operating Point	Parameter	Unit 1	Unit 2	Unit 3 (estimated)
Lower 1%	Discharge	8,589 cfs	11,071 cfs	11,621 cfs
	Power	59.9 MW	77.3 MW	81.0 MW
Peak	Discharge	9,861 cfs	11,313 cfs	11,863 cfs
	Power	69.6 MW	79.9 MW	83.7 MW
Upper 1%	Discharge	13,662 cfs	11,955 cfs	12,505 cfs
	Power	95.3 MW	83.5 MW	87.2 MW

Type of outage required: OOS until blade welding completed

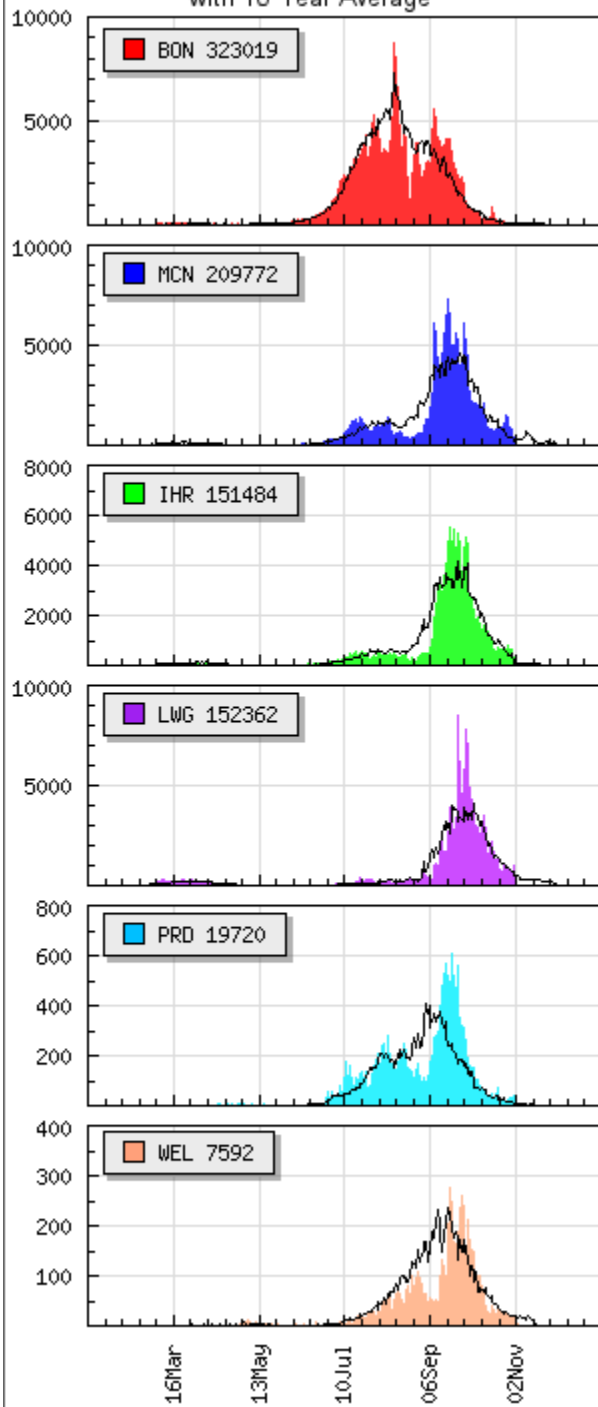
Impact on facility operation: Unit 3 unavailable until further notice

Dates of impacts/repairs: Ongoing

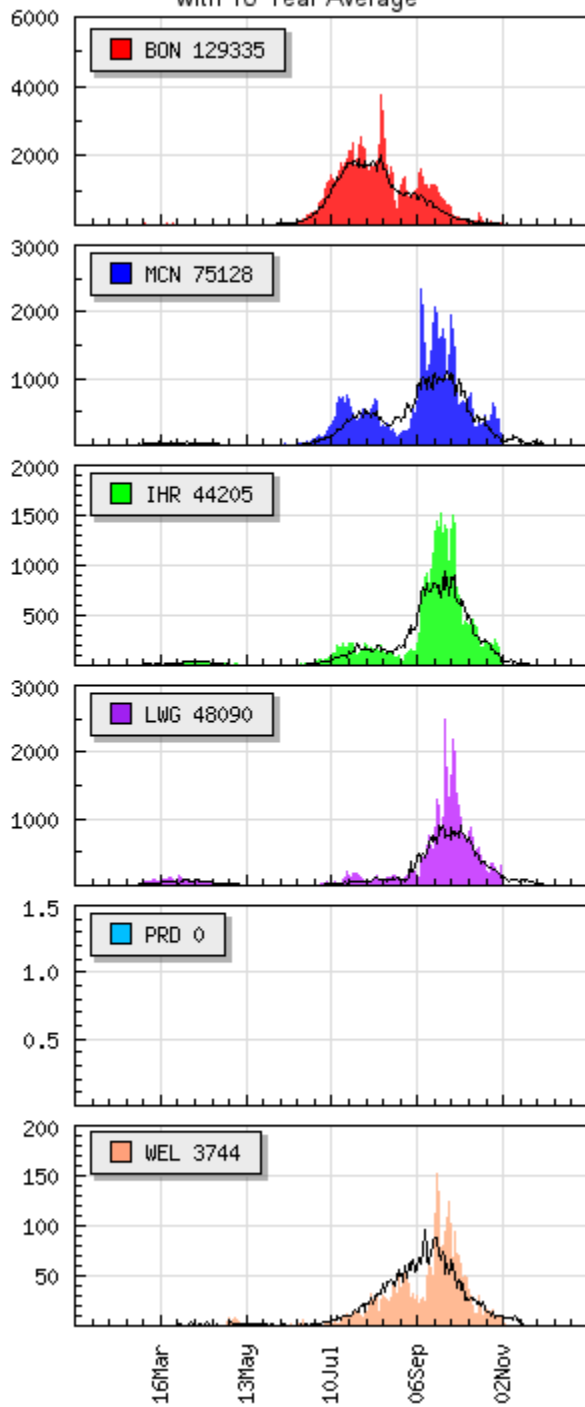
Length of time for repairs: 2.5 mos

Expected impacts on fish passage: Minimal adverse impact to adult migrants due to low river flows and unit 1 availability. Ice Harbor adult fish passage decreases from November 1 into the winter months, as displayed by the attached graphs.

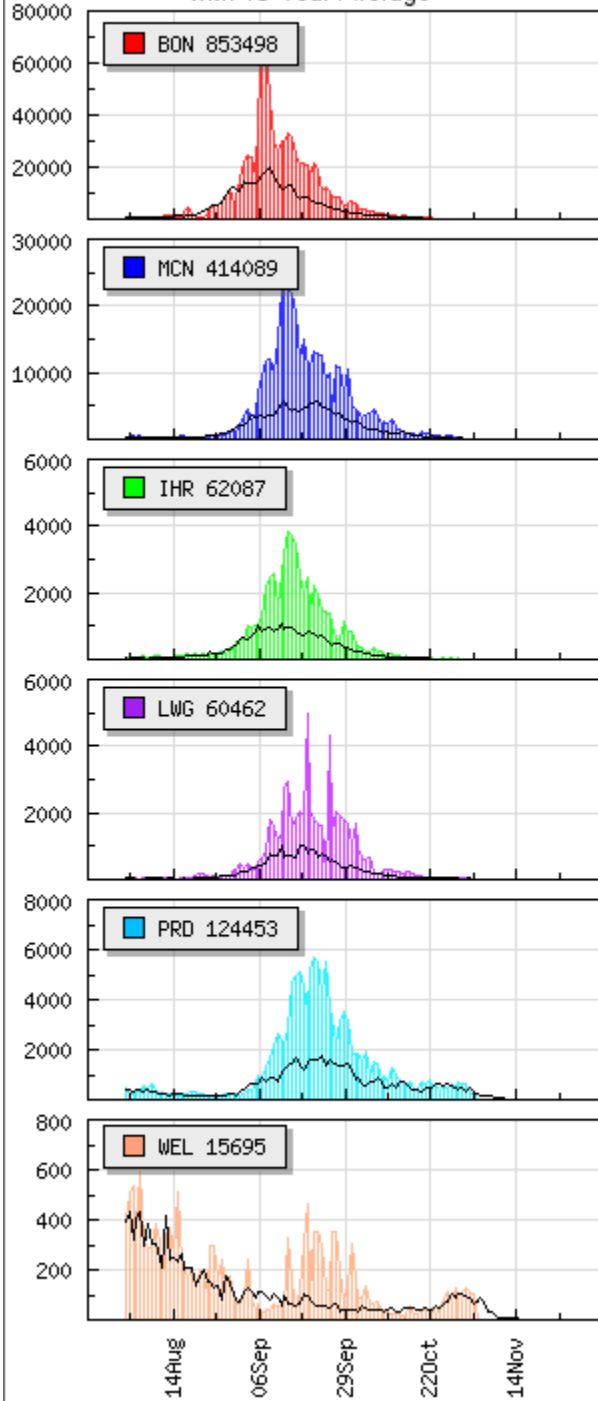
2014 Steelhead Adult Passage (Mar-Nov)
with 10 Year Average



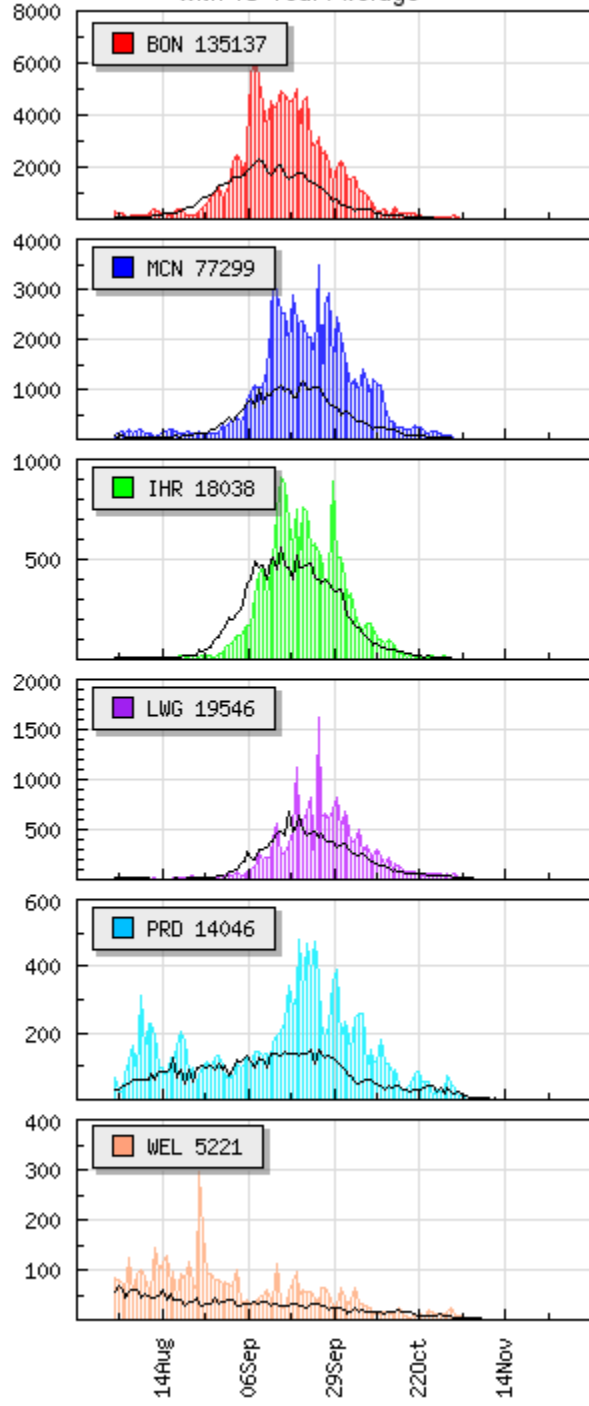
2014 Steelhead-Wild Adult Passage (Mar-Nov)
with 10 Year Average



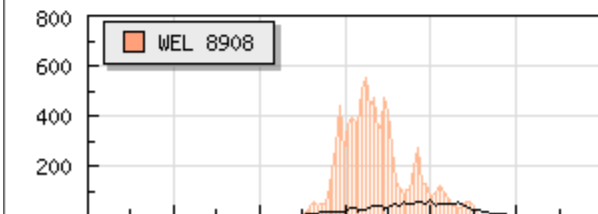
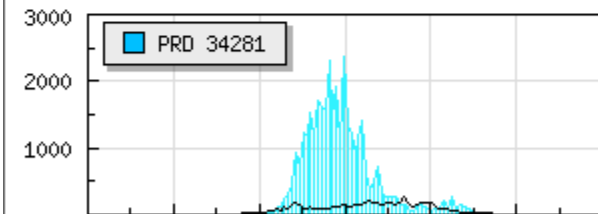
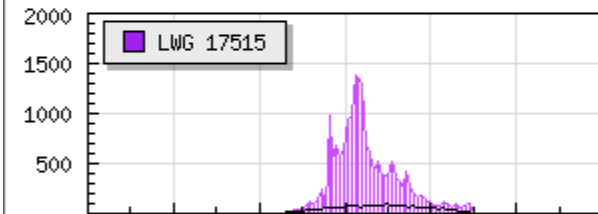
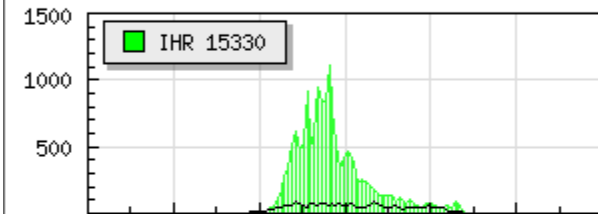
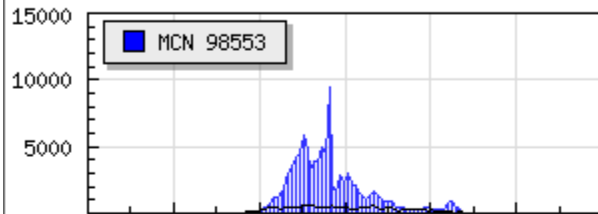
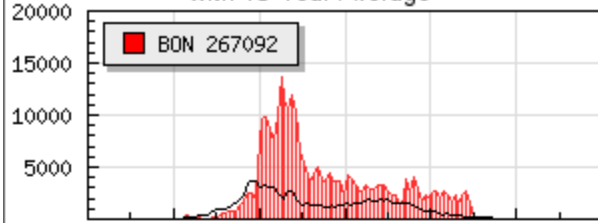
2014 Chinook Adult Passage (Aug-Nov)
with 10 Year Average



2014 Jack Chinook Adult Passage (Aug-Nov)
with 10 Year Average

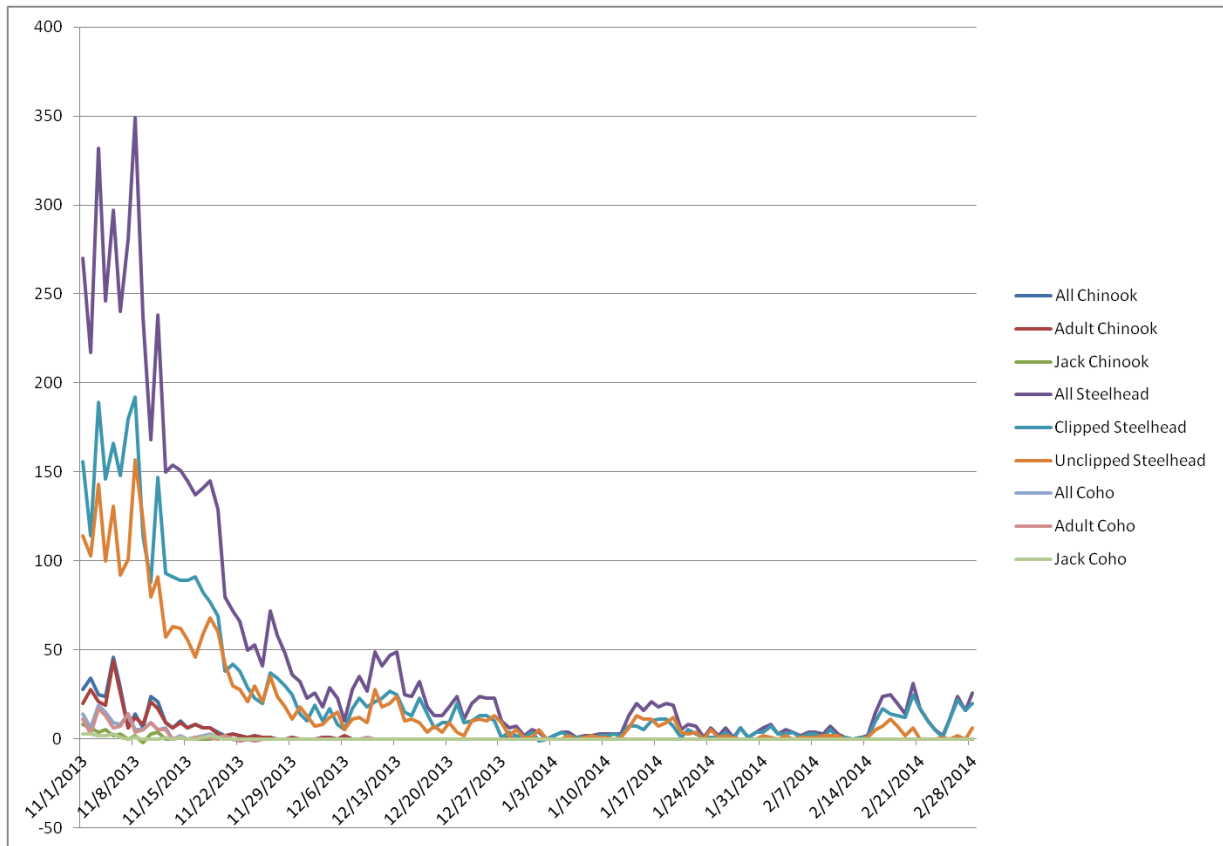


2014 Coho Adult Passage (Aug-Nov)
with 10 Year Average



14Aug 06Sep 29Sep 22Oct 14Nov

Ice Harbor Dam adult fish passage counts from Nov 1, 2013 to Feb 28, 2014



Comments from agencies

Final results

Please email or call with questions or concerns.

Thank you,