

23 December 2010

TO: Tom Lorz
Columbia River Inter-Tribal Fish Commission

FROM: Sean Tackley
U.S. Army Corps of Engineers, Portland District

SUBJECT: Turbine cooling water strainers and juvenile lamprey entrainment at Bonneville, The Dalles, and John Day dams

Dear Tom:

Tammy Mackey forwarded CRITFC's request for information regarding the Portland District's turbine cooling water strainer inspections, as they relate to potential juvenile lamprey entrainment and mortalities. This is something I have been discussing with our project biologists recently, given the documented problems at Walla Walla District dams. Project biologists at each project provided a summary of current turbine cooling water strainer configurations and inspections:

1. BONNEVILLE DAM (BON)

- Main turbine units at Bonneville Dam's First Powerhouse (B1) are equipped with both (new) automated and manually-cleaned (old) turbine cooling water strainers. Odd-numbered main units (1, 3, 5, 7, and 9) are equipped with automated strainers and even-numbered main units (2, 4, 6, 8, and 10) are equipped with the older, manual strainers. Main unit intakes at B1 for cooling water are inside the scroll cases. Turbine cooling water strainers are currently inspected when the units come down for overhaul (5 years for B1 units) or if pressure differentials indicate a clogging problem.
- At B1, the station service unit (B0), which is equipped with a manual strainer, has an intake that can be moved either to the penstock (approx. elev. 0) or the pier nose (very low in water column). B1 also features a cooling water/fire water supply system, which is equipped with a manual system and takes its water from the penstock.
- Main turbine units at the Second Powerhouse (B2) are all equipped with automated turbine cooling water strainers. Turbine cooling water strainers are currently serviced annually, when each unit is taken down for annual maintenance.
- Automated cooling water strainers are set in an automatic mode, which runs a cleaning cycle monthly. If debris (and pressure accordingly) builds up, then the system will automatically run a cleaning cycle. Automated strainers are manufactured by the Hellan Strainer Company, and can be found on the following website: <http://www.hellanstrainer.com/>.
- Scott McKinnon (maintenance crew) has never seen lamprey in main unit turbine cooling water strainers in the ~15 years he has worked at Bonneville Dam. McKinnon reported that maintenance crews primarily see debris (vegetation) and clam shells in

the strainers. At least one juvenile lamprey was noted in an inspection of the B1 station service unit (B0) in 2009.

- **ACTIONS:** Ben Hausmann (BON Chief of Fisheries) is currently making arrangements to see operators check the manual strainers at B1 the next time they do it, but it is unknown when this may occur. To date, no plans have been made for regular inspections.

2. THE DALLES DAM (TDA)

- Main turbine units at The Dalles Dam are equipped with either manually-cleaned (old) cooling water strainers or new automated strainers. To date, automated strainers have been installed at seven main turbine units: 1, 2, 5-8, and 14. Manually-cleaned strainers are still in operation at fifteen main units: 3, 4, 9-13, and 15-22. All strainers, manual and automated systems, are annually serviced when main units are taken out of service for annual maintenance. Intakes for all main units and fish units are in their respective scroll cases. Station service units 1 and 2 pull cooling water from a domestic water source.
- Pressure differentials on the old (manually-cleaned) strainers are monitored daily via gauges attached to each system. Strainers are serviced and cleaned if the pressure differential indicates a clogging problem.
- Juvenile lampreys and other fishes have been seen in turbine cooling water strainers at The Dalles Dam. In recent years, juvenile shad appear to be the main biotic component when the cooling water strainers are inspected. However, maintenance crews have reported seeing juvenile salmonids and juvenile lampreys in small numbers. Main units 1 through 5 are involved in the majority of biotic-related strainer clogging incidents, though the Project currently does not keep detailed records from inspections.
- **ACTIONS:** Bob Cordie (BON Chief of Fisheries) is currently making arrangements to see operators check the manual strainers during annual maintenance. To date, no plans have been made for regular inspections.

3. JOHN DAY DAM (JDA)

- Main turbine units at John Day Dam are equipped with manually-cleaned (old) cooling water strainers. Pressure differentials on turbine cooling water strainers are checked daily by JDA operators to identify potential debris build-up in the system. The differentials on JDA strainer gauges are typically zero (indicating a lack of debris in the strainer), so the strainers are visually inspected only occasionally (every 2-3 years).
- 96 dead juvenile lampreys were found inside the powerhouse AC service cooler's strainer on 19 April, 2010. There is only one such cooler at JD Powerhouse and its water supply's intake is located inside of the operating MU13 gatewell, while all turbine cooling systems have intakes inside of their respective scroll cases. Although inspections were not routinely recorded in the past, this appeared to be an isolated incident as none of those involved recalled any similar incidents in the past.
- In early summer (June-July) of 2010, a single live juvenile lamprey was found and released into the river (in excellent condition) during a routine maintenance inspection of the turbine cooling water strainer for MU 12.

- **ACTIONS:** In 2009, after a number of juveniles were found at Snake River dams (as reported at FPOM in April 2009), Miro Zyndol (JDA Chief of Fisheries) informed JDA maintenance staff of the need to monitor and report all lamprey trapped inside of cooling water strainers. JDA operators and maintenance personnel are aware of the cooling water strainers' potential impact on juvenile lamprey. JDA personnel currently plan to continue daily differential monitoring and document any presence of juvenile lamprey in strainers whenever they are seen.

I hope you find this summary useful. Please feel free to contact me for questions regarding USACE Portland District lamprey studies and Derek Fryer (509-527-7280) regarding Walla Walla District lamprey studies.

Best Regards,
Sean

Sean C. Tackley
Technical Lead, Adult Salmon and Lamprey Passage Programs
Fish Passage Team
USACE Portland District
Phone: 503-808-4751
Email: sean.c.tackley@usace.army.mil