

SYSTEM OPERATIONAL REQUEST: #2020-2

WALLA WALLA DISTRICT

The following State, Federal, and Tribal Salmon Managers have participated in the preparation and support this SOR: National Oceanographic and Atmospheric Administration, U.S. Fish & Wildlife Service, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Nez Perce Tribe, Yakama Nation, Confederated Tribes of the Colville Reservation, Spokane Tribe of Indians, Warm Springs Tribe, and the Columbia River Inter-Tribal Fish Commission/Confederated Tribes of the Umatilla Indian Reservation.

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FROM: Charles Morrill, FPAC Chair

DATE: March 25, 2021

SUBJECT: Optimize fish passage during McNary Emergency Bypass Operations

OBJECTIVE:

Use adaptive management actions to help minimize the impact of lost fish protection measures while McNary Dam is operating in emergency bypass to achieve the following objectives: 1) minimize powerhouse passage, 2) optimize passage conditions for fish that experience the emergency bypass route, and 3) optimize tailrace egress for fish that experience the emergency bypass route.

SPECIFICATIONS:

This SOR seeks to operate McNary Dam using the three recommended actions outlined below while emergency bypass operations are in effect.

- To achieve objectives 1 and 3, use TSW spill and training spill up to TDG standards from April 1 through April 9. Change spill operation to 125% tailwater TDG% spill (24 hours per day, 7 days a week) or minimum generation (depending on flow conditions) beginning April 10 until emergency bypass operations end and normal bypass operations are restored. Revert to flex spill operations when normal bypass operations are restored.
- To address objective 2, prioritize increased debris monitoring and cleaning. For example, as practicable: cycle orifices every 2-hours, TSW operation to clear forebay debris, head differential monitoring.
- To address objective 2, continue operation with currently deployed screens (four), install additional screens starting with lowest priority units on April 2, with remaining screening completed by April 15.

JUSTIFICATION:

The unplanned outage of the McNary bypass system, and implementation of emergency bypass operations, interrupts the planned operations specified in 2021 regulatory documents. Any actions that erode the fish protections in the planned operations are subject to an adaptive management response. In the current situation, tools exist at McNary Dam to lessen the impact of operating the emergency bypass route.

The McNary emergency bypass operation results in a reversal in the direction of the flow that normally travels through the bypass collection channel, removes all PIT-tag detection capabilities, eliminates fish monitoring and evaluation—including GBT sampling and fish condition monitoring, and foregoes measures that deliver bypassed fish downstream of the tailrace BRZ (see Figure 1 for details). In addition, the emergency bypass route operation involves every bypassed fish traveling through one of two restrictive rectangular slots in the collection channel floor that drop vertically into a concrete flow structure designed to move ice and debris (Figure 2). The emergency bypass route is a more restrictive and turbulent route that increases risks to fish (injury, fish condition, and survival) over those generally expected in the usual bypass route when using the normal primary or secondary bypass operations. Similarly, the exit point of the ice trash sluiceway delivers flow to the face of the dam in the area where ERDC modeling work has identified surface flow pattern concerns that can negatively influence fish egress out of the McNary tailrace (see Figure 1 for details).

Emphasizing operation measures that increase the probability of fish taking a non-powerhouse route can be an effective adaptive management approach that can reduce both fish passage through the emergency bypass route and turbine route. Establishing a surface passage route from April 1 – 9 and increasing spill on April 10 will accomplish the goal of increasing the probability of fish taking a non-powerhouse route, countering the impacts from emergency bypass passage that a significant number of later migrating fish will experience.

All three of the actions outlined above can enhance survival probabilities that would otherwise be reduced during the emergency bypass operation. The three actions, in concert, can improve fish protections by reducing probabilities of fish using the powerhouse passage route, improve passage conditions of those fish that do pass through the emergency bypass route, are reasonably implementable on short timelines, and are easily reversed when operations return to normal, planned operations.



Figure 1. Photograph illustrating McNary Dam tailrace during spill operations and different pathways expected during different fish passage operations. The green circle (top center) is the primary and secondary outfall for bypassed fish, and the green arrow (top right corner) represent the primary top spill weir jet created for use by spilled fish. These green references show passage routes expected in 2021 regulatory documents. The spill pattern simulations at ERDC, in part, emphasized a design that minimized encounters in the red crossed-out circle at the top right. In addition, the spill pattern simulations at ERDC emphasized a design that minimized the encounters with the strong transition areas and eddying (faded red crossed out circle in the center), including the location of past debris. Both these areas were strongly emphasized as the least desired areas for emigrating fish. The red circle with emphasized arrows (middle left) represents the point every emergency bypassed fish is entering the tailrace with emphasis on the flow vectors that each can face.

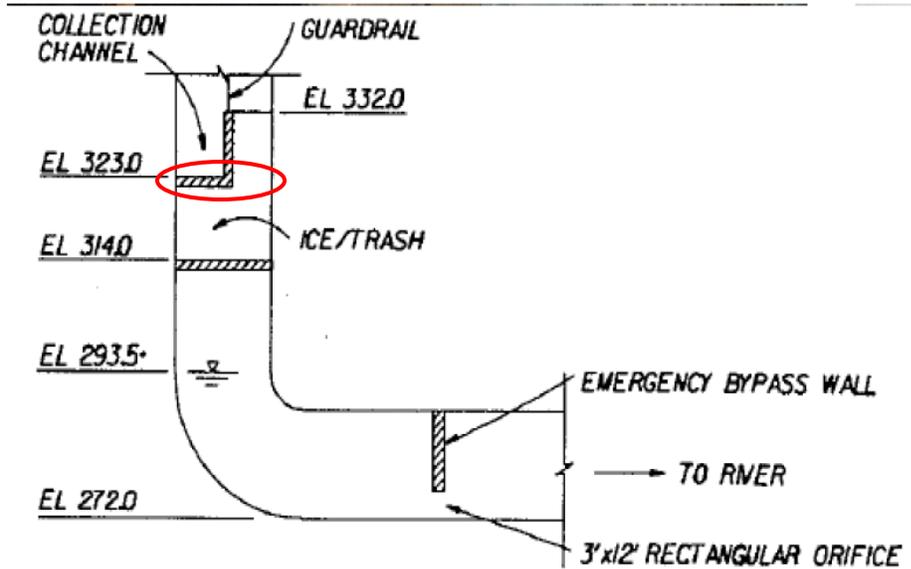


Figure 2. Top: Photograph (aerial view) of two rectangular slots in the collection channel floor that drop vertically into a concrete flow structure designed to move ice and debris. All fish experiencing the emergency bypass would pass through these slots. **Bottom:** Red circle in diagram highlights the floor of the collection channel, where these two slots are located (diagram not drawn to scale).