



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE



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June 21, 2017

### MEMORANDUM

To: Susquehanna River Coordinator, Maryland Fishery Resources Office, Annapolis, MD  
Attention: Sheila Eyler, Fish and Wildlife Biologist

From: Jesus Morales, Hydraulic Engineer, Fish Passage Engineering

Subject: Inspection of fishways at Safe Harbor Hydroelectric Project (FERC #1025) on April 26, 2017

A seasonal inspection of the fish passage facilities at the Safe Harbor Hydroelectric Project (Project) was performed at 1:00 pm on Wednesday, 04/26/2017. The USFWS (Service) review team was led by Sheila Eyler and Richard McCorkle. Consultants to the owner from Normandeau Associates, and personnel from Pennsylvania Fish & Boat Commission, Maryland Department of Natural Resources, and NOAA-Fisheries were also present.

This site review included the catwalk located in front of the power house, and a tour through the fishway. The operators performed a lift cycle while the Service personnel were on site. On the day of the inspection two entrance gates were open: gate-A (farthest away from the power house building) attracts fish into the fishway by discharging water into the downstream direction, parallel to the river flow; and gate-C (closest to the power house building) attracts fish by discharging water perpendicular to the river flow, into the backside of the catwalk. The power house units discharge flow through a series of draft tubes that pushes the boil and turbulence away from the power house building, into the area downstream from the catwalk. Safe Harbor Water Power Corporation typically operates their fishway from the beginning of April until early June. River flow was approximately 74,000 cubic feet per second on the day of the inspection.

Significant items are highlighted below:

#### **Entrance gates:**

- Horizontal steel bars continue to be present at the openings of entrance gates A and C. On a September 26, 2016 report, Brookfield submitted to USFWS a structural analysis into the functionality of these horizontal crossbars, also referred to as top stabilizing members. The report was developed by Providence Engineering Corporation. Providence Engineering explains that these stabilizing members were originally intended to be “temporary in nature”, and that “the middle and lower leaf extension channels are sufficient in capacity to act alone without the top stabilizing members”. The structural analysis was completed with a loading safety factor of 2.0 and a presumption that there is no hydrostatic pressure aiding in the stability of the member, which there is. Providence Engineering goes on to conclude that even though the leaf extension



channels technically provide enough structural stability to the leaf gates under these extreme and conservative conditions, they would still recommend not removing the stabilizing members because “it is unclear as to the consequence the removal of the stabilizing members would have on the gates w.r.t. being lifted while racked”. USFWS believes that the safety factor and the presumption of no hydrostatic pressure aiding in the stability of the member provides enough buffer to account for most unforeseeable situations that might affect the structural integrity of the gates. Furthermore, the report does not introduce or considers any potential alternatives that could replace these temporary top stabilizing members (e.g., increasing the size of the leaf extension channels, or reallocating the stabilizing members to a higher elevation so that they’re always positioned outside of the water column). As they stand today, these stabilizing members protrude into the flow path exactly at the location over the entrance weirs where fish are swimming against the highest water velocities within the fish lift. The Service continued preference is that fish not be exposed to protrusions, sharp edges, and other objects in the flow path that could cause injury. Figure 1 in the Appendix shows the steel bar at gate C.

#### **Exit channel:**

- Debris issue – Some amount of debris was observed at the waterway upstream from the exit channel, surrounding the trash rack that is intended to keep debris from entering the fishway. In an attempt to address this problem, the Licensee has installed air pumps to push the debris away from the trash rack. The amount of debris material surrounding the exit area has the potential to cause some delay on the migrating fish and be a possible source of injury for fish trying to exit the lift.

#### **Crowder area:**

- V-shaped crowder gate opening – During the site inspection, the opening of the V-shaped crowder gate was 3-feet wide during fishing mode, as informed by the operators. USFWS fish passage criteria suggest that an 18-in width provides enough lateral space for adult American shad to safely swim through. The Service recommends maintaining the V-shaped crowder gate at an 18-in opening during fishing time as to minimize possible fall backs from fish that successfully enter the crowding area.

#### **Additional observations made during this review:**

- The Service continues to be concerned about the conditions in and around the exit channel upstream of the counting room. The exit channel receives a significant amount of debris. Some debris is prevented from going into the channel by the operation of air pumps upstream from the exit trash rack, but some debris still finds its way into the exit channel and gets clogged at the skimmer wall inside of it.
- Even though the air pump might be doing a good job at keeping some debris out of the exit channel, it is important to remember that American shad is known to avoid air bubbles in their flow path, and that air bubble curtains have been used in the past to deter American shad from moving into an undesired location.
- The Service requests that some type of monitoring gets implemented at this site to evaluate the fish behavior within the exit channel and through the transition into the headpond. A recording from a waterproof camera (e.g., a GoPro camera) could possibly be enough, but the Service is willing to entertain other types of monitoring technology.
- The Service requests a copy of the operational plan, or operational matrix, for Safe Harbor’s fish lift under the full range of fish passage design flows.
- The Service is also requesting an opportunity after the end of the fish passage season to do an inspection of the fish lift while de-watered and non-operational. The Service is particularly

interested in looking at the conditions of the floor diffusers, among other things that are not typically visible during normal operating conditions.

- Service personnel were not able to measure head differential between the water surface elevation (WSE) inside the fishway and the WSE at the tailwater, which seemed like it could've been higher of a drop than what we typically recommend (i.e., 4 to 6 inches). The Service respectfully requests that easily accessible staff gages be installed at both upstream and downstream locations from the entrance gates.

Thank you for the opportunity to participate in this review. We look forward to supporting your efforts to restore the Susquehanna River ecosystem. For questions please contact Jesus Morales at 413-253-8206.

## Appendix



Figure 1: Gate C steel bar crossing through the water column, right at the path that fish would use to move into the fishway