United States Department of the Interior

FISH AND WILDLIFE SERVICE

300 Westgate Center Drive
Hadley, MA 01035-9589

October 7, 2016

MEMORANDUM

To: Susquehanna River Coordinator, Mid-Atlantic Fish & Wildlife Conservation Office
Attention: Sheila Eyler, Project Leader

From: Jesus Morales, Hydraulic Engineer, Fish Passage Engineering

Subject: Inspection of Fishways at Conowingo Hydroelectric Project (FERC #405) on May 5, 2016

A seasonal inspection of the fish passage facilities at the Conowingo Hydroelectric Project (Project) was performed at 1:00 pm on Thursday, 05/05/2016. The Project is owned and operated by the Exelon Corporation (Exelon). The USFWS (Service) review team was led by Sheila Eyler. The tour was led by licensee's representative and Environmental Manager, Kimberly Long. Consultants from Normandeau Associates, Inc. (NA) and from Gomez and Sullivan were also present, as well as personnel from Maryland Department of Natural Resources and NOAA-Fisheries. On the day of the inspection the river flow was around 50,000 cfs.

The Project is currently under re-licensing. Overall fish passage issues have been identified by the Service in previous annual fish passage inspection reports. An agreement for future fish passage efforts and infrastructures was achieved and submitted to FERC on June 7, 2016. This inspection memo focuses solely on existing facilities and their operations. No significant changes have followed after the 2012, 2013, 2014, and 2015 inspections.

This site review focused solely on operations at the east fish lift (EFL). There are no downstream facilities at the Project; historically, downstream movement has occurred through the turbines. Seasonal upstream eel passes were not yet installed at the time of this inspection. Multiple cycles for the lift were operated during the site visit. Based on this year's review, the salient passage issues appear to center on the following:

East Fish Lift (Upstream Passage):

- Attraction flows - The EFL attraction water is fed through the western-most spillway bay. A significant fraction of this flow is passed down the ogee crest, through a stilling basin and into the entrance channel. Consistent with previous years, the stilling basin is still not capable of dissipating enough energy to effectively allow the discharge of the original design flow (i.e., 900 cfs). The aeration and turbulence observed have been shown to dissuade shad movement. Discussions with Exelon's operators suggest that the current entrance channel design is incapable

of passing more than 300 cfs without significant turbulence and aeration. Delays and ineffective passage due to insufficient attraction water continue to be a concern.

- Hydraulic conditions - Flow eddies and other undesirable hydraulics continue to be present within the fish lift channel, specifically in the area over the floor diffuser and around the turnings in the channel. These adverse conditions can potentially impact the migratory cues and orientation of available fish, causing delays and/or fallbacks for those fish that have found the entrance but have yet to be crowded into the hopper.

- Operation of entrance gates - The EFL currently does not operate with more than one entrance gate opened at a time. During the day of the inspection, gate C (the most downstream gate out of all three available gates) was the only gate operating. Even though gates A and B were supposed to be completely closed, gate B was still discharging enough weir flow to allow fallbacks from disoriented or unmotivated fish.

- Fish impingement by the v-shape screen gate at the counting room - The v-shape screen gate, located at the exit channel, in front of the counting room window, was observed during the operation of a lift cycle while it went from a closed position to an opened position. The Service noticed the fish congregating against the downstream face of the gate while the gate was in a closed position, but because the v-shape gate opens outward, multiple fish ended up impinged against the channel wall once the gate was fully opened. The Service is concerned with the high risk of injury for those fish that get stuck in between the gate and the channel wall. If the licensee plans to continue to use this gate, the Service requests that changes to the gate be made so that the chances for impingement are minimized.

De-watered inspection of the EFL on September 29th, 2016

- During a separate site visit on September 29, 2016, the Service had the opportunity to evaluate the conditions of the EFL while this was dewatered. With the fishway mostly drained, the Service was able to take pictures and assess all those components of the lift that are usually not visible during the fish passage season visit, when the lift is watered and operating. During the visit, personnel from the Gomez & Sullivan were taking measurements and installing water level loggers throughout the fish lift with the purpose of collecting data and eventually calibrating a 3-D CFD model of the hydraulics in the lift. The Service intends to collaborate with the licensee through the development of this hydraulic model, and review any necessary changes to achieve the desired hydraulic conditions for effective fish passage.

Thank you for the opportunity to participate in this review. For questions please contact Jesus at 413-253-8206.