United States Department of the Interior

U.S. FISH AND WILDLIFE SERVICE
Maine-New Hampshire Fish and Wildlife Service Complex
Ecological Services
Maine Field Office
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Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E
Washington, DC 20426

November 15, 2022

RE: Downstream Eel Passage Standard - Maine

Dear Secretary Bose,

On May 23, 2017, the Department of the Interior, through the United States Fish and Wildlife Service (Service) submitted its Preliminary Prescription for Fishways (Prescription)[1] for the Mattaceunk Hydroelectric Project (Project; FERC No. 2520) and finalized that Prescription on June 27, 2018.[2] On February 26, 2021, the Federal Energy Regulatory Commission (FERC; Commission) issued a new license (License) for the Project.[3] The Prescription's fish passage conditions, required by Ordering Paragraph (E), are attached as Appendix B to the License.

Section 12.2.2 of the Prescription states, "The Licensee shall operate the Project to exceed the minimum downstream survival efficiency criterion of 76 percent of the adult (i.e., silver) American eel moving downstream past the Project." This survival efficiency criterion is based upon the Sweka et al. (2014) American eel egg-per-recruit (EPR) model (Model)[4] which indicates that cumulative silver eel survival passing three to four dams must exceed a minimum of 76 percent at each dam and must be higher to rebuild the American eel population. However, the Service recently received information that the referenced model does not apply to the

[1] Accession No. 20170523-5083.
[2] Accession No. 20180627-5030.
[3] 174 FERC ¶ 62,135
[4] Sweka, J. A., Eyler, S., and Millard, M. J. 2014. An egg-per-recruit model to evaluate the effects of upstream transport and downstream passage mortality of American eel in the Susquehanna River. *North American Journal of Fisheries Management*, 34:764-773.

Penobscot River, for the reasons described by the model's developer in the attached memo (Attachment A).

Therefore, the Service is notifying the Commission that the Model was parameterized specifically for the Susquehanna River and model results cannot be directly applied to the development of passage standards at any facilities outside of the Susquehanna River watershed.[5]

If you have any questions, please contact Julianne Rosset of this office at julianne_rosset@fws.gov.

Sincerely,

AMANDA CROSS Digitally signed by AMANDA CROSS
Date: 2022.11.15 16:36:53 -05'00'

Amanda S, Cross, Ph.D.
Project Leader
Maine Field Office
Maine-New Hampshire
Fish and Wildlife Service Complex

cc: PIN, Dan McCaw
NMFS, Jeff Murphy
MEDEP, Kyle Olcott
MEDMR, Casey Clark
MEDIFW, John Perry, Kevin Dunham
RO/Fisheries, Bryan Sojkowski
ES, JRosset:9-30-22: (207)-298-3080

[5] This letter will be filed on FERC online for each hydropower project in the state of Maine.

United States Department of the Interior
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Date: 5/11/22
To: Julianne Rosset
From: John Sweka and Sheila Eyler
RE: Application of the Sweka et al. (2014) American eel EPR model to the Penobscot River

Dear Ms. Rosset,

The use of the Sweka et al. (2014) American eel egg-per-recruit (EPR) model to prescribe a minimum downstream passage survival for eels of 76 percent at Mattaceunk Hydroelectric Project (FERC No. 2520) on the Penobscot River represents a misuse of model results.

The model was designed to determine a level of downstream survival for American eels to ensure that the overall reproductive potential for eels emigrating from the Susquehanna River would not be reduced during silver eel migration if eels were passed upstream of hydroelectric projects. The published model was specific to the situation on the Susquehanna River in which American eels are captured at the first dam on the river (Conowingo Dam, P-405) and trucked upstream of the other four hydroelectric projects: Muddy Run Pumped Storage Station (P-2355), Holtwood Dam (P-1881), Safe Harbor Dam (P-1025), and York Haven Dam(P-1888). The model assumed that any migrating silver eels originated from either below Conowingo or above York Haven Dam, and no eels matured to the silver stage between dams. Because American eels have been precluded from passing above the four mainstem dams on the Susquehanna River for many decades, contemporary life history parameters for American eels in the Susquehanna do not exist and the model was largely theoretical in nature and borrowed life history parameters documented in scientific literature from other river systems. Given the life history parameters used and spatial structure of the hydroelectric projects on the Susquehanna River, Sweka et al. (2014) determined a “break-even threshold” cumulative downstream passage survival of 33 percent was needed. At this level, passing eels upstream resulted in the same EPR as not passing eels upstream of Conowingo Dam. Higher cumulative downstream passage survival would result in a higher EPR. The 33 percent “break-even threshold” is specific to the Susquehanna River and the life history parameters used in the modeling of that situation and should be considered a minimum level to ensure additional harm to the population is avoided. Something greater than the “break-even threshold” is needed to increase the population.

In the discussion section of the Sweka et al. (2014) paper (page 771), the authors describe the sensitivity of model results to the input parameters and the effect these input parameters would have on the “break-even threshold.” Differences in growth, natural mortality, and the proportions of eels that become female in river reaches above dams compared to reaches below dams will have a large effect on the location of the “break-even threshold”. Appropriate application of this model to other systems requires updating the life history parameters to be specific to the river system in question because of their large effect on model results.

As stated by Sweka et al. (2014), "If emigrating American eels are required to pass more hydroelectric facilities, the downstream passage survival at each hydroelectric facility will need to increase in order to realize any reproductive benefit from upstream passage or transport." The Susquehanna River was very simple to model with only five hydroelectric projects in succession and those projects in relatively close proximity on the lower mainstem of the river. However, the spatial structure of the Penobscot River is more complicated with more hydroelectric dams in the watershed, the dams spread over larger distances, and the dams located on multiple tributaries within the watershed. Additionally, eels are not trucked from the first dam on the Penobscot, upstream of all of the other dams. This complicated spatial structure would result in different portions of the silver eel population encountering different numbers of dams during migration. Thus, a spatial structure that more accurately reflects the Penobscot River would need to be incorporated into the model before it could be used to make a downstream passage survival criterion at a specific hydroelectric project in that system.

In conclusion, the modeling framework by Sweka et al. (2014) can be useful in determining passage criteria. However, direct application of the "break-even threshold" of 33 percent cumulative downstream passage survival to other river systems represents a misuse of the model. If emigrating silver eels only need to pass four dams, each with 76 percent downstream passage efficiency, and the life history of American eels was the same as that modeled in the Susquehanna River, then the 33 percent cumulative downstream passage target (0.76 x 0.76 x 0.76 x 0.76 = 0.33) would be appropriate. However, there are more than four dams on the Penobscot River through which silver eels need to pass, and life history of American eels in the Penobscot River likely differs from those modeled on the Susquehanna River. Differences between the Susquehanna River and the Penobscot River were not considered when recommending the 76 percent downstream passage target for the Mattaceunk Project. Therefore, use of the 76 percent downstream passage target in for the Mattaceunk Project is not appropriate. The intent of the Sweka et al. (2014) paper was to present a model that could be adapted to other rivers, not to present a downstream passage survival criterion to be used in other rivers. Modification of the model in terms of life history input parameters and spatial structure is necessary when applying the modeling methodology to other rivers.

Sincerely,

John Sweka and Sheila Eyler

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