An Objective Analysis of the Stressor to Identify the Key Threats to Wild Atlantic Salmon (Salmo salar) in the United States

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Through a number of structured management and recovery planning efforts (74 FR 2934, 2009; Fay *et al*., 2006; and U.S. Fish and Wildlife Service and NOAA Fisheries, 2019), the U.S. has compiled an inventory of threats/stressors negatively impacting the productivity of the endangered Gulf of Maine Distinct Population Segment of Atlantic salmon (GOM DPS). In total, 16 categories of stressors and 82 possible actions that could be taken to address the stressors have been identified. Of those, the major stressors identified to date are: dams, the inadequacy of regulatory mechanisms related to dams, low marine survival, road crossing barriers, international intercept fisheries and changing environmental conditions. To facilitate an approach to address these stressors, NOAA Fisheries identified three categories of action that could be taken to address these high-level stressors (NOAA Fisheries, 2021). These are: 1) actions that reconnect the Gulf of Maine to headwater streams, 2) actions that improve habitat productivity to increase the number of smolts successfully entering the marine environment, and 3) actions that increase our understanding and ability to improve survival in the marine environment. Collectively, these efforts have served as the basis for guiding actions for the recovery of salmon in the U.S.

In 2024, NOAA Fisheries sought funding to support a project to advance and evolve our understanding of threats to U.S. Atlantic salmon. The proposed project included three specific elements: 1) develop a semi-quantitative 3-dimensional stressor classification model similar to the stressor analysis conducted by Norway (Forseth *et al*., 2017); 2) identify all the management actions that are available to counteract the stressors identified in element one; and 3) conduct a series of Management Strategy Evaluations (MSEs) to identify which management actions would be most effective at achieving our desired recovery objectives. MSEs are grounded in a simulation-based analytical framework, which can take on varying forms of complexity and can be used to evaluate the likelihood of management actions having the desired effect, according to predefined management objectives. When complete, this analysis will provide an assessment of the likelihood of each management action contributing to the recovery of the Atlantic salmon GOM DPS. This information, coupled with the ranking of stressors (element 1) and the available management options (element 2) will provide managers with a more complete understanding of options that will, and as importantly, options that will not result in a high likelihood of achieving recovery goals.

The funding for this project was approved in late 2024, but delays in fund delivery and contractor hiring have prevented progress. Efforts are ongoing to initiate this project. Until an updated stressor analysis has been completed, the U.S. will continue to use the three categories of actions listed above to guide recovery efforts in the U.S. and as the basis for NASCO reporting during the fourth reporting cycle.

Citations:

74 FR 29344. 2009. Endangered and Threatened Species; Determination of Endangered Status for the Gulf of Maine Distinct Population Segment of Atlantic Salmon.

Fay, C., Bartron, M., Craig, S., Hecht, A., Pruden, J., Saunders, R., . . . Trial, J. 2006. Status Review for Anadromous Atlantic Salmon (*Salmo salar*) in the United States. National Marine Fisheries Service and U.S. Fish and Wildlife Service.

Forseth, T., Barlaup, B. T., Finstad, B., Fiske, P., Gjøsæter, H., Falkegård, M., ... & Wennevik, V. (2017). The major threats to Atlantic salmon in Norway. *ICES Journal of Marine Science*, *74*(6), 1496-1513.

National Marine Fisheries Service (NOAA - Fisheries). 2021. Species in the Spotlight Priority Action 2021 - 2025: Atlantic Salmon (*Salmo salar*)

U.S. Fish and Wildlife Service and NOAA-Fisheries. 2019. Final recovery plan for the Gulf of Maine Distinct Population Segment of Atlantic salmon (*Salmo salar*).