Great Lakes Fishery Commission – Fish Passage Sorting Technology Analysis

Position: Post-doctoral Fishery Research Scientist / Engineer

Background: The bi-directional selective fish passage (FishPass) project at the Boardman/Ottaway River's Union Street Dam in Traverse City, MI is a multi-agency collaboration aimed at providing up- and down-stream passage of desirable fishes while simultaneously blocking or removing undesirable and invasive fishes. Developing selective passage solutions for a mixed assemblage of fish requires an approach that accounts for variability within the assemblage by grouping species into guilds on the basis of their sortable phenological, morphological, behavioral, and physiological attributes. Passage and blockage schemes can then be formulated on the basis of differences and commonalities among guilds as opposed to the less efficient prospect of sorting individual species. The FishPass Advisory Board recently completed a guild analysis project that (1) compiled the FishPass Sortable Attribute Database, which includes 21 attributes and 220 species (Benoit et al., 2023), and (2) identified seven major attribute gradients that help to separate species into five distinct clusters. Based on the sortable attributes identified through the guild analysis and expert opinion, the FishPass Advisory Board has generated a list of 15 sorting / guidance technologies to screen for potential implementation at FishPass.

FishPass is currently under construction, and on-site selective fish passage research is expected to begin by 2027. In preparation for day one research, the FishPass Advisory Board has identified the need to compile the functional (and theoretical) capabilities, uncertainties, and configurations of the 15 sorting / guidance technologies identified for potential use in FishPass, and to use this information to prioritize 1-2 configurations for initial testing at FishPass.

Responsibilities: The research project is partitioned into two phases each focused on one objective: (1) conduct a literature review on applications of sorting / guidance technologies and assign separation values (i.e., efficacy) and uncertainties for each across all species or guilds in the Boardman/Ottaway River; and (2) implement a modified Bayesian separation method to identify 1-2 configurations of sorting technologies for testing at FishPass during the first-year research. The duration of each phase is 12 months (two years total). In Phase 1, members of the FishPass Science Team will assist the incumbent in compiling relevant literature as well as associated contextual information/covariates regarding deployment/installation of each technology. The incumbent will be responsible for coordinating the literature review, screening literature for quantitative assessments of efficacy, and summarizing operational parameters and areas of future application and research. In Phase 2, the incumbent will be responsible for modifying a Bayesian separation method (Wolfe et al., 2010) to account for multiple input streams of fish with unique size distributions, as well as uncertainty in measures of efficacy. The anticipated outcome of Phase 2 will be a short-list of sorting configurations that have the greatest likelihood of achieving the desired levels of selective passage that will be evaluated during the first year of on-site research at FishPass. Findings from this work will be used to develop selective fish passage schemes at FishPass with broad ranging implications for fishway designs globally. The incumbent will lead the publication of 1-2 peer-reviewed journal articles per research phase and will present findings to the FishPass Advisory Board and at international scientific conferences.

Qualifications: The ideal candidate will have a PhD in biology or ecology (ideally animal behavior, and/or functional morphology) or alternatively in statistics, mathematics, or engineering with a background in biology or ecology. Strong quantitative and statistical modeling skills, and a demonstrated ability to effectively communicate science via peer-review publications and conference presentations are required. Experience with synthetic activities including literature reviews, data compilations, or Bayesian statistics and demonstrated ability to work independently and remotely is preferred.

Applicants are encouraged to submit a cover letter, CV, relevant publications, and names and contact information for three references to Dan Zielinski (dzielinski@glfc.org). The anticipated start date for the position is June 1, 2024 or sooner. The work can largely be done remotely, but in-office space can be made available. If desired, applicants may work under an existing academic affiliation with support for engagement in the project from their current supervisor.