



## MIGRATORY FISHERIES SERVICES

### *Fish Passage Studies*

We utilize our expertise in aquatic science and engineering disciplines to investigate and solve fish movement and passage issues. Our staff are experienced in conducting fish tracking and telemetry studies to evaluate routes of passage using various methods such as radiotelemetry, acoustic telemetry, and Passive Integrated Transponder (PIT) tag tracking. We conduct complex statistical analyses to evaluate the data from these studies and use the results to inform the design of fish passage modifications and enhancements. We are experienced in upstream eel passage studies, including tracking eel movements and developing short- and long-term passage solutions. We have conducted many downstream fish passage and protection studies, which may involve desktop entrainment and turbine passage survival studies, designing equipment retrofits at hydroelectric plants for field studies, an analysis of the need for additional fish passage and protection measurements, as well as a feasibility study and engineering design of such measures if needed.

### *Aquatic Habitat & Hydraulic Modeling*

Our staff are equipped and experienced to carry out aquatic habitat assessments to identify fishery-related issues and help clients mitigate instream flow fluctuations. Related services include demonstration flow studies, Instream Flow Incremental Methodology (IFIM) studies, one- and two-dimensional habitat-hydraulic modeling, and habitat timeseries analyses. Our two-dimensional models have been developed to support aquatic habitat assessments, fish passage studies, and design using programs such as the US Army Corps of Engineers' (USACE) HEC-RAS 2D as well as River2D.

### *Computational Fluid Dynamics Modeling*

Our fish passage evaluation and design work involves the development of hydraulic models, including one-dimensional, two-dimensional, and computational fluid dynamics (CFD) models. Our CFD modeling efforts have addressed issues such as fish passage utilizing the FLOW-3D model. We combine the results of our effectiveness studies with CFD modeling output to evaluate fish passage holistically and inform fish passage modifications. We use advanced modeling approaches such as coupling CFD models developed for turbines to CFD models we have developed to analyze the system as a whole.

### *Fish Passage Engineering*

Our staff have been involved in the evaluation, feasibility assessment, design, permitting, and construction phase services for various fish passage facilities, including technical upstream fishways (e.g., lifts, ladders), trap and transport, nature-like fishways, and downstream passage structures. These facilities have been designed for target species such as Atlantic Salmon, American shad, river herring, and American eel. We have also designed zones of passage including velocity refuges to enhance upstream passage success.

### *Population Modeling*

Our staff have expertise in analyzing and modeling the potential effects of dams and other human influences on the movement, habitat use, and population dynamics of both diadromous and freshwater fish. We develop population models using the best available science and utilize these models to test scenarios in a particular watershed. Scenarios address questions related to passage standards, fish population recovery, energy-fish tradeoffs, and marine-derived nutrient balance, among others. Our staff are experienced in working with existing population models as well as developing new models.

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Hydraulic Modeling

Computational  
Fluid Dynamics  
Modeling

Fish Passage  
Engineering

Population  
Modeling

#### LOCATIONS

Utica, NY  
315-724-4860

Henniker, NH  
603-428-4960

Albany, NY  
518-407-0050

Buffalo, NY  
716-250-4960