

## **Eightmile River Instream Flow Study - Phase II**

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### **Introduction**

In August 2003, the Instream Habitat Program was requested to develop the concept for an instream flow study that would describe the status quo of Eightmile River and provide guidance for the creation of long term management plans for the watershed. The study should encompass the following objectives:

1. Establish an understanding of the existing flow regime of the Eightmile Watershed, i.e. what is the hydrograph for the Eightmile River?
2. Document the type and quality of existing aquatic life and related habitat.
3. Determine if deficiencies exist in the assemblage of aquatic species and habitats present in the river system.
4. Establish seasonal target flow levels that will support the desired level of aquatic diversity.
5. Identify threats to sustaining a healthy aquatic system from instream flow deficiencies.

6. Identify opportunities for rehabilitating or enhancing aquatic habitat where appropriate.
7. Identify tools that can be used to evaluate potential threats to the river ecosystem and establish a management strategy to protect instream flow and channel structure.
8. Development of a target fish community.

Running waters belong to the most complex and dynamic ecosystems of our planet. The Eightmile River shares features unique to that subset of high quality New England rivers characterized by unregulated flows and transition from fluvial to an estuarine system. To address all of the above objectives, it is necessary to gather extensive data and develop dynamic hydrological, biological and habitat models of the river and watershed. These models are necessary to quantify the relationship between the aquatic community and supporting habitats, as well as direct and indirect consequences of human actions. We propose to conduct the project in two phases. The first phase includes collection of baseline information on hydrological and biological conditions and to establish the status quo of aquatic fauna during summer season. In conclusion of this phase we would develop the list of recommended research topics and concepts for the second phase of the project.

### **Objectives of Phase I:**

The objective is to determine the hydrological and biological status quo of Eightmile River and develop the work plan for Phase 2. We collected baseline or “benchmark” information from historical documents related to flows, water usage, fisheries and wildlife and riparian vegetation at a time prior to major hydrologic alterations in the watershed. We assembled information on the current status of habitats, fish, invertebrate, and (flow-dependent) protected species in the Eightmile River basin, and identified deficiencies in the current data. We summarized this information in the Phase I report.

### **Objectives of Phase II:**

Based on obtained information we identified a number of tasks that should be addressed in the future research. This includes development of habitat model for fish and freshwater mussels, conducting continuous temperature and flow observations. We also determined a need for more comprehensive data fish and freshwater mussel habitat data collection in the Hamburg Cove with a special emphasis on acoustic pollution and alteration of water salinity.

Due to limited funding for 2005 the Eightmile River Study Committee recommended to limit the

Phase II to development of fish habitat model for Eightmile River and East Branch and flow time series analysis. Following tasks will be included in this phase:

1. Based on remote sensed data, fish-collections of 2004 and in consensus with the Eightmile River Study Committee delineate the river into homogenous and select 7-10 representative sites for habitat data collection.
2. Map the spatial distribution of fish habitat availability four times under a range of low flow conditions in representative sites.
3. Compute a MesoHABSIM habitat model for the fish community. Create GIS map of representative sites at 4 low flow conditions for selected 5-10 species (adult resident and young-of-the-year fish) and flow vs. habitat rating curves.
4. Develop flow vs. habitat rating curves for selected species (adult and YoY) in designated river reaches (eg. East Branch, Main stem) and for the entire mapped river. The curves will allow to determine the optimal level of habitat (flow) during the summer seasons (July- September).
5. Compute habitat time series to determine minimum, critical and typical levels of habitat (flow) in summer season, with their frequency and duration (present conditions). This will allow to setup rules that will protect the river and fish fauna as it is now, by recommending for how long, and how frequently the habitat may stay below certain levels.
6. Install 5 stage and HOBO thermal recorders at selected locations.
7. Reporting and peer-reviewed publication.

The results and deliverables of this project and with recommendations for further steps will be summarized in Phase II report and in two peer-reviewed journal publications.