



US Army Corps  
of Engineers®  
New England District

## Federal Interest Determination

### Royal River, Yarmouth, Maine §206 Aquatic Ecosystem Restoration



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696 Virginia Road, Concord Massachusetts, 01742-2751

#### 1. Project Authority and Purpose

The New England District of the U.S. Army Corps of Engineers (USACE) received a request for assistance from the Town of Yarmouth, Maine to investigate opportunities for ecosystem restoration in the Royal River Watershed.

Section 206 Aquatic Ecosystem Restoration, of the Water Resources Development (WRDA) of 1996, as amended, authorizes USACE to carry out aquatic ecosystem restoration projects that will improve the quality of the environment, are in the public interest, and are cost-effective. USACE conducted an initial appraisal and determined there is a Federal interest for an Aquatic Ecosystem Restoration project at this location along the Royal River. This report summarizes the determination process.

The purpose of the proposed project is to assess the first two dams above the head of tide on the Royal River owned by the Town of Yarmouth: the Bridge Street Dam and the East Elm Street Dam. Both dams have nonfunctioning fishways.

The project has the potential to restore access to about 71 miles of river habitat for federally listed fish species and non-listed anadromous fish species, providing the fish with upstream access to historic reproductive habitat for adults and nursery habitat for the development of eggs and juvenile life stages. With Yarmouth's fish passage barriers addressed in the watershed, up to 135 miles of reproductive and nursery habitat may also be made accessible to migratory fish species, including blueback herring (*Alosa aestivalis*), alewives (*Alosa pseudoharengus*), American shad (*Alosa sapidissima*) American eel (*Anguilla rostrata*), sea run brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*), and sea lamprey (*Petromyzon marinus*). Restoring fish passage on the Royal River will also benefit mammals and avian predators that prey upon fish species that include bears, foxes, eagles, ospreys and loons. Likewise, water quality conditions may be expected to improve due the resumption of historic flushing patterns.

The federally listed threatened Atlantic Sturgeon (*Acipenser oxyrinchus*), the endangered Shortnose Sturgeon (*Acipenser brevirostrum*) and the endangered Atlantic salmon (*Salmo salar*) are recorded to occur within the Royal River. Restoring the Royal River will likely support the federally listed threatened Atlantic Sturgeon and endangered Shortnose Sturgeon overwintering habitat for adults, reproductive and nursery habitat for egg and juvenile life stages. The Shortnose Sturgeon was originally listed as an endangered species by the U.S. Department of Interior in March, 1967 (32 FR 4001)

(NMFS, 1996). The Shortnose Sturgeon remained on the Federal Endangered Species List with enactment of the ESA in 1973. On February 6, 2012, the Gulf of Maine Distinct Population Segment (DPS) of Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) was listed threatened under the Endangered Species Act (ESA) (78 FR 69310) and on August 17, 2017, the National Marine Fisheries Service designated critical habitat (82 FR 39160). On November 17, 2000, the Gulf of Maine Distinct Population Segment of Atlantic salmon was listed as endangered by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (65 FR 65459). On December 20, 2005, the National Marine Fisheries Service and the United States Fish and Wildlife Service announced the availability of the final recovery plan for the Gulf of Maine distinct population segment of Atlantic salmon (*Salmo salar*). On June 19, 2009, the National Marine Fisheries Service issued a final rule designating critical habitat for the Atlantic salmon (*Salmo salar*) Gulf of Maine Distinct Population Segment (74 FR 293000).

The proposed Royal River feasibility study will develop an array of alternatives to restore essential fish habitat for federally listed and non-listed species. Two dams that occur within the lower reach of the Royal River, the Bridge Street Dam and East Elm Street Dam, restrict the upriver migration of listed and non-listed migratory fish species. The existing fish passage structures (e.g., ladders) do not efficiently pass species up river towards the headwaters of the Royal River. The Denil fish ladders were originally installed in the 1970s to support the commercial alewife and blueback herring fisheries. Removal of the dams and dilapidated fish ladders or reconstruction of the fish passage structures would restore fish passage in the Royal River and make available access to reproductive and nursery habitat for these and other species of native fish, plants and invertebrates.

## **2. Location of the Project**

The headwaters of the Royal River originates in Sabbathday Lake, New Gloucester and flows downstream for about 39 nine miles and empties into Casco Bay, Yarmouth, Maine. The Royal River is a freshwater environment that transitions into an estuarine, tidally influenced aquatic environment in Yarmouth. The head of tide is located approximately at the East Main St. /Route 88 Bridge in Yarmouth as shown on Figure 1a. The two project locations (1) E Street Dam and (2) Bridge Street Dam are shown on Figures 1a, 1b, and 1c. Both project locations are in the vicinity of private properties, and may require real estate coordination for construction operations.



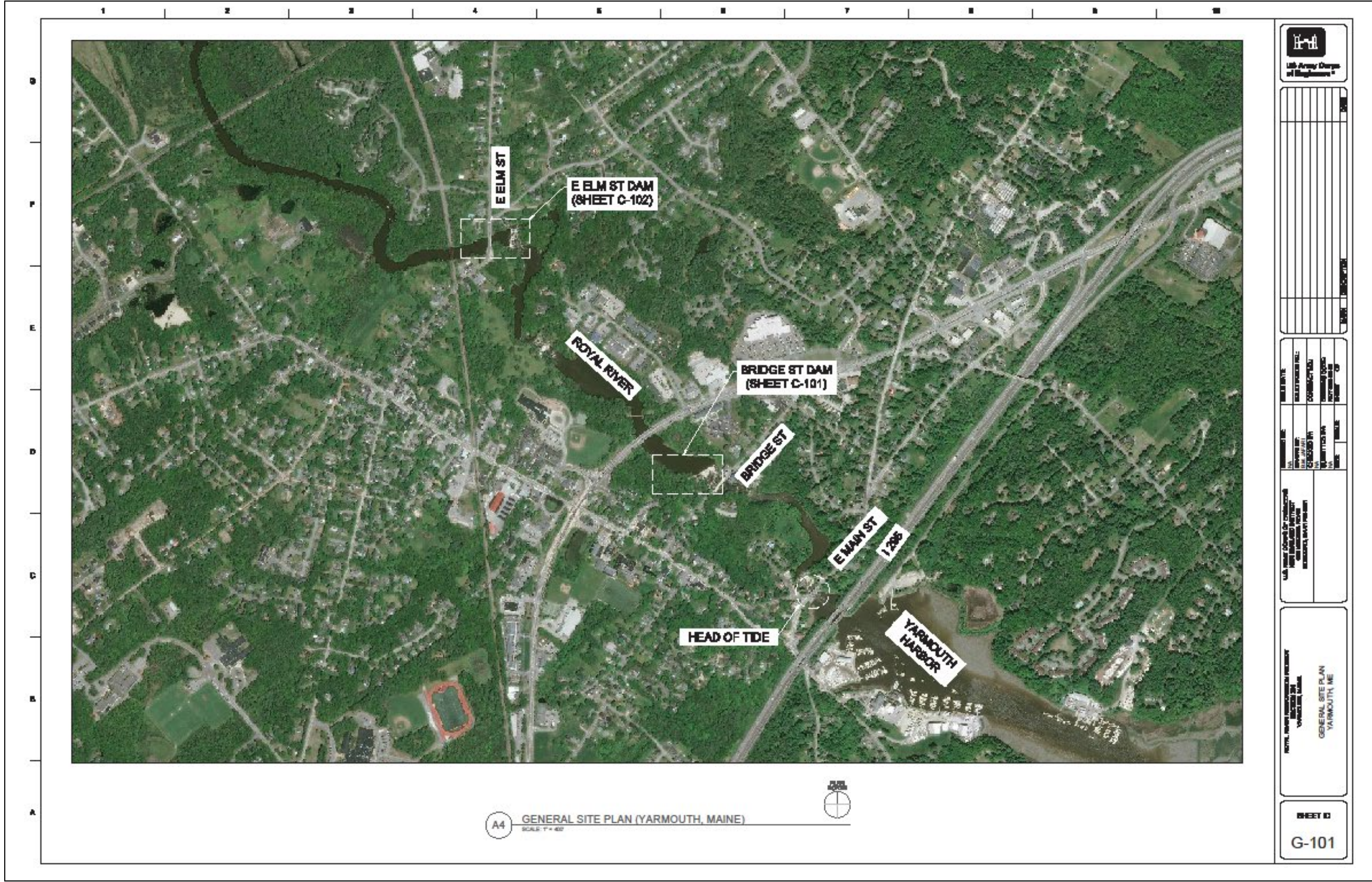


FIGURE 1a. Royal River, Yarmouth, State of Maine.





FIGURE 1b. East Elm Street Dam/Fish Passage, Royal River, Yarmouth, State of Maine.







### **3. Project Description**

The East Elm Street Dam was originally constructed in 1857 and the current non-functioning fish passage was built in 1979. The Bridge Street Dam was originally constructed in 1894 and the current non-functioning fish passage structure was built in 1973. Two potential alternatives have been identified: (1) Complete removal of the dams, or (2) Reconstruction of fish passage structures. Removal of one dam with improvement of fish passage at the other would also be considered. Dam removal must address natural downstream transport of associated sediments or removal and onsite reuse of materials that have accumulated on the upriver side of both dams. Sediment sampling will be necessary to understand the level of risk and spatial extent of contaminants of concern that may persist in sediments on the upriver side of the dams. Characterizing contaminants that may exist at both dams will allow NAE to determine appropriate options for disposal, reuse, or release of sediments associated with the existing dam structure. These data will also allow NAE to effectively evaluate the potential risks and exposure pathways to ecological receptors and humans. Concern with impounded sediments extends to any impacts on maintenance of the Federal Navigation Project which ends below East Main Street and I-295, as well as the marinas and town landing facilities.

### **4. Resource Significance**

To determine Federal interest in a potential restoration project, the Corps must first determine that the project will restore significant resources. Significant environmental resources are defined as those that are institutionally, publicly, or technically recognized as important.

**4.1 Institutional Recognition:** Institutional recognition is demonstrated through the establishment of laws, restrictions, plans and policy statements by public agencies, tribes or private groups that acknowledge the importance of the environmental resource. Institutional recognition is supported by the following:

- The Anadromous Fish Conservation Act of 1965 was enacted to conserve, enhance and manage anadromous fishery resources. All species that return to rivers to spawn from the ocean are included. Anadromous species known to ascend the Royal River include Atlantic salmon, river herring (alewife and blueback herring), American shad, rainbow smelt, sea run brook trout and sea lamprey.
- Restoring the Royal River will likely support the federally listed threatened Atlantic Sturgeon and endangered Shortnose Sturgeon overwintering habitat for adults, reproductive and nursery habitat for egg and juvenile life stages.
- The Royal River is not part of the endangered Atlantic salmon Gulf of Maine Distinct Population Segment under the Federal Endangered Species Act (ESA) of 1973, as amended, but improved fish passage in the Royal River may support salmon populations in the region as a whole.

- The Maine Department of Environmental Protection, NOAA, USFWS and USACE Regulatory Division work together to enforce the ban of use of non-North American strains of Atlantic salmon to protect the native population.
- The Northeast Fishery Management Council was established and prepared a Fishery Management Plan for Atlantic Salmon originally implemented in 1988
- The North Atlantic Salmon Conservation Organization (NASCO) is an international organization, established in 1982 for the purpose of managing, protecting, conserving and enhancing North Atlantic salmon stocks. Establishment of this organization demonstrates international recognition of species significance. Countries participating include United States, Canada, the European Union, Denmark, Norway, and the Russian Federation.
- Corps of Engineers Ecosystem Restoration Policy (Engineering Pamphlet 1165-2-502, 30 September 1999) specifically identifies anadromous fish as significant.
- American shad are managed under Amendment 3 to the Interstate Fishery Management Plan (FMP), while river herring are managed under Amendment 2 to the FMP
- Maine DMR regulations 13 188 Chapter 30 regulate the take of river herring in Maine waters
- Both the National Oceanic and Atmospheric Administration (NOAA) and Maine DMR actively manage river herring in the Gulf of Maine in order to sustain the fisheries.

**4.2 Public Recognition:** Public significance is demonstrated when the general public recognizes the importance of an environmental resource. In a letter dated April 8, 2013, the Town of Yarmouth requested the assistance of the Corps in improving fish passage at the East Elm Street Dam and Bridge Street Dam under the Section 206 program.

- The Town of Yarmouth produced the Royal River Corridor Master Plan in 2008, which recommends that a comprehensive study be completed to understand the advantages and disadvantages of removing the dams and conducting other fish passage improvements.

**4.3 Technical Recognition:** Technical significance is demonstrated by scientific or technical knowledge or judgment concerning the importance of the environmental resources or attributes in the study area. Technical recognition is demonstrated by numerous studies, research and programs focusing on anadromous fish species:

- Restoration of fish passage in the Royal River will support recovery goals for both the Atlantic Sturgeon and Shortnose Sturgeon and are consistent with the NOAA 2017 designation of critical habitat for Atlantic Sturgeon and NOAA 1998 recovery plan for Shortnose Sturgeon.

- The River Herring Technical Expert Working Group is comprised of scientists, industry representatives, conservation groups, tribal leaders, and government officials, and released a River Herring Conservation Plan in 2015.
- Maine Rivers, a non-profit environmental organization, maintains an interest in restoring migratory fish habitat in the Royal River and occasionally conducts restoration activities such as clearing debris from blocked channels
- The establishment of the United States Atlantic Salmon Assessment Committee which produces data rich technical reports summarizing returns to select rivers in Maine
- The establishment of the Atlantic Salmon Biological Review Team, which includes members of tribal natural resources specialists, United States Fish & Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the Atlantic Salmon Commission (ASC).
- Research conducted by the United States Geological Survey at various labs and centers such as the Conte Anadromous Fish Research Facility in Massachusetts; research includes topics such as Atlantic salmon growth modeling
- Research funding by the USFWS and related state fish and wildlife agencies throughout New England; research includes topics such as modeling the timing of downstream migration of Atlantic salmon smolts and impacts associated with climate change
- Preparation of the Maine Atlantic Salmon Commission's 10-Year Strategic Plan
- Federal Marine Fish Habitat Restoration and Creation Program administered by the U.S. Army Corps of Engineers and the National Oceanic & Atmospheric Administration (NOAA) research habitat restoration and creation opportunities. These opportunities include anadromous, estuarine, and marine fish habitats.
- The Federally managed Craig Brook National Fish Hatchery established in 1889 to raise and stock juvenile Atlantic salmon for Maine waters, Maine DMR has also run river herring re-stocking programs on the Royal River in the past.
- Federal Watershed Protection Approach an initiative developed by the U.S. Environmental Protection Agency (EPA), is to maintain and improve the health and integrity of aquatic ecosystems using comprehensive approaches that focus resources on the major problems facing these systems within the watershed context.

Evidence of technical significance is also often grouped into categories to allow for comparing resource significance among competing restoration projects for Federal funding support. The support for this project within each criterion is provided below:

**Scarcity, Status and Trends** – Dam construction is a major cause in population declines for diadromous fishes in Maine (ASMFC 2020). The significance of Atlantic salmon is demonstrated by the species scarcity (rareness) and trend toward further population decline. Atlantic salmon were bountiful and naturally



reproducing in rivers and streams draining along the east coast from the Hudson River in New York to the Canadian border. The Committee on Atlantic salmon in Maine reports a minimum of 1,050 adult salmon returned to U.S. Rivers in 2001, a drastic decline from a half million in the 1800's (NRC 2003). Even fewer returns in 2002, with the majority (90%) of adult salmon returning to one river in Maine, the Penobscot (NRC 2003).

The Royal River once supported an important alewife and shad run. American shad also continue to support a small but important recreational fishery (State of Maine, 1982). Alewives are a key part of the food chain in Maine marine ecosystems, and scientists in Maine have linked declines in cod stocks to the declines in alewife numbers (NRCM 2020).

The Atlantic States Marine Fisheries Commission (ASMFC) found in 2012 that river herring stocks were depleted to near historic lows. Of the 52 stocks of river herring assessed in that report, 23 were depleted to near historic levels, one was increasing, and 28 could not be assessed due to inadequate trend data (ASMFC 2020). A 2007 coast-wide stock assessment also found American shad populations to be at historic lows with little sign of recovery (ASMFC 2020).

**Limiting Habitat** - There is limited available habitat for the species and habitat loss within the suitable areas continues to decline. Dams block access to upstream spawning areas, which is particularly important for the sustainability of river herring populations. As previously mentioned, the historic habitat included North Atlantic rivers as far south as the Hudson River, NY and north up through Canada. Today, 60% of all remaining U.S. Atlantic salmon habitat occurs in Maine. Centuries of dam construction on Maine rivers severely limited river herring access to spawning habitat. Lack of fish passage combined with other environmental pressures such as pollution continues to limit river herring habitat.

**Connectivity** - Connectivity is a measure of the degree of habitat or population fragmentation; ranging from "connected and sustainable," to "fragmented," to "isolated." Connectivity in the Royal River is isolated and fragmented. Low flows, road crossings and dams prevent anadromous fish migration and result in discontinuous and disturbed habitats. Both dams are a complete barrier to spawning and rearing habitat for anadromous fish in the Royal River.

**Biodiversity** – Fragmented and blocked upstream spawning habitat results in less robust populations with reduced ability to adjust to physical, chemical, and biological changes, as spawning populations are clustered into a small number of suitable areas.

**Representativeness** - Representativeness is a measure of an environmental resource's ability to exemplify the natural habitat or ecosystems of a specified geographic range. The Royal River watershed contains historically important river herring spawning habitat in Sabbathday Lake and Runaround Pond.

## **5. Federal Interest**

Based on this initial appraisal, there is a federal interest in proceeding with a Section 206 aquatic ecosystem restoration project for fish passage at both the East Elm Street Dam and Bridge Street Dam. The existing dams impede upstream migration of several species of federally listed species, such as the threatened Atlantic Sturgeon and the endangered Shortnose Sturgeon, as well as diadromous fish designated as species of concern (e.g., river herring). The improved fish passage at the dam will aid in the recovery of these species and is consistent with the goals of the Federal Endangered Species Act, Magnuson Stevens Fishery Conservation and Management Act and the Anadromous Fish Conservation Act.

## **6. Sponsor**

The non-Federal sponsor for this project is the Town of Yarmouth. The sponsor understands the cost sharing requirements of the Section 206 authority and has indicated that they are interested in proceeding with a feasibility study.

## **7. Schedule**

Contingent on funding, NAE has the capability to start the study the beginning of FY2021 with completion in mid FY2023.

## **8. Potential Issues/Constraints**

There are no significant issues or constraints identified at this time. The Corps will work with the Town of Yarmouth to formulate alternatives that take into consideration their desire to have fish passage.

## **9. Environmental Assessment**

As an environmental restoration project, the objective is to restore the system to a more natural, less degraded state. The project is expected to enhance fish and wildlife habitat within much of the Royal River watershed. Other Federal and state agencies are supportive of the project. It is expected that only an Environmental Assessment and Finding of No Significant Impact is needed. Initial correspondence with the local community indicates support of the study.

## **10. Costs**

NAE is proposing a detailed feasibility analysis of alternatives to restore anadromous fish passage and improve aquatic habitat conditions in the Royal River watershed. The primary focus will be passage at the East Elm Street Dam and Bridge Street Dam but areas within the larger watershed may be considered. The initial suite of potential alternatives include dam removal, partial removal, modification of the dam crest height, nature-like bypass, modification to the existing denil and new passage structures on the opposite bank from the existing denil structure. The estimated cost for this feasibility study is \$660,000. Initial order of magnitude cost of potential restoration alternatives are not expected to exceed the \$10 million Section 206 statutory limit on Federal project costs. Recent costs from the fall of 2019 for similarly sized dams in Rhode Island



yielded costs ranging from \$2.1million for removal of a dam. Various other options (natural fish passages or multiple alternatives for installing a new Denil Fish ladder) had costs ranging from \$1.7M to \$3.8M. These costs include allowance for design and supervision, inspection and overhead, and have been escalated to the first quarter of 2025. Although removal of one of the Yarmouth dams may be complicated by the presence of nearly 100,000 cubic yards of contaminated soil, costs for a new fish passage or fish ladder should not exceed \$7.6M for both the East Elm Street Dam and Bridge Street Dam, combined, and is clearly below \$10 million.

#### **11. Recommendation**

It is recommended that the USACE enter into a Feasibility Cost-Sharing Agreement (FCSA) with the Town of Yarmouth, Maine to investigate an aquatic ecosystem restoration project at the Royal River.

#### **12. Contact**

For any questions, please contact the project manager, Dr. Kristine Reed at 978-318-8963.

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