

Goal 3: Restore migratory and diadromous fish population abundance and range and restore and protect the aquatic habitats on which they depend in North Carolina.

Southeastern river systems have been dramatically modified from historic conditions through the alterations of stream flows, changes in water quality, and the construction of dams along critical migratory routes. These modifications have altered aquatic biodiversity and fisheries resources of North Carolina's rivers. In addressing these and other factors affecting migratory fishery resources, we will work closely with our federal, state and private partners to implement relevant programs related to improving habitat quality and quantity. Our objectives defined below complement those identified in the Service's Southeast Region Fisheries Plan, Aquatic Resources Strategic Plan, the Service's National Fish Passage Program, Southeast Aquatic Resource Partnership, and the State/Federal Albemarle-Pamlico Comprehensive Conservation and Management Plan. With respect to migratory fish, our specific mandate is to protect and restore diadromous fisheries in North Carolina, which include American shad, hickory shad, blueback herring, alewife, striped bass, Atlantic sturgeon, shortnose sturgeon, and American eel. Nearly all of these fish species provide commercial and recreational economic benefits. Other migratory fish include native riverine fishes that have become reduced in abundance and range. Our goal for these species is to restore their abundance and range and improve habitat to increase carrying capacity.

Within the next five years the following actions are expected:

- 1) Removal of Milburnie Dam;
- 2) Measurable progress on the implementation of Yadkin Pee Dee Fish Restoration Plan;
- 3) Completion of fish passage weir at Cape Fear River Lock and Dam #1, and contribute to planning for and implementation of passage on Lock and Dam 2 and 3;
- 4) Stocking of at least 4 million American shad in the Roanoke River, providing passage via trap and transport from Roanoke Rapids Dam to above Kerr Dam when populations are sufficient to do such and providing American eel passage at Gaston Dam when populations warrant such.

Objective 3.1: (*Biological Planning*) Prioritize habitat and management barriers to increase diadromous fish stocks.

Strategy 3.1.1: Dams that block diadromous fish from historically important spawning sites sometimes have endangered mussels and fish in the river system. Planning will ensure no adverse impacts occur to those resources and will aim at achieving a positive effect.

- Strategy 3.1.2: Identify areas with water quality problems affecting migratory fish (especially in regards to dissolved oxygen deficiencies).
- Strategy 3.1.3: Identify water flow problems affecting migratory fish (particularly timing, magnitude, and duration of regulated flows).
- Objective 3.2: (*Conservation Design*) Develop a clear pathway for restoration of diadromous fish population to historic levels.
- Strategy 3.2.1: Work with partners to identify and prioritize removal of barriers to historic spawning and rearing habitat.
- Strategy 3.2.2: Develop restoration projects with state, federal, non-profit, public partners.
- Objective 3.3: (*Conservation Delivery*) Implement identified pathways to restore diadromous fish populations, and enhance rare species that share the same habitat.
- Strategy 3.3.1: Provide funding for and technical assistance to remove dams, build and repair fish passage structures.
- Strategy 3.3.2: Restore, conserve and protect in-stream, riparian buffers and riverine wetland habitats.
- Strategy 3.3.3: Encourage management of water flows and quality necessary for life prerequisites for diadromous fish populations and rare aquatic species that share the same habitat.
- Strategy 3.3.4: Work with FWS Division of Fisheries and Sport Fish Restoration, NC Wildlife Resources Division, NC Division of Marine Fisheries, National Marine Fisheries Service, Atlantic States Marine Fisheries Commission, and non-governmental organizations to accomplish any stocking (augmentation, reintroduction) required and to insure any proposed new dams are required to have fish passage .
- Objective 3.4: (*Assumption-Driven Research*) Support aquatic research to test techniques and suggest improvements.
- Strategy 3.4.1: Use cooperative agreements and grant authority to accomplish research thru USGS, NC State University, Duke University, East Carolina University, University of North Carolina at Chapel Hill and other universities as appropriate.

- Strategy 3.4.2: Support migratory fish monitoring efforts such as tagging efforts by state agencies, cooperative winter cruises, and others.
- Strategy 3.4.3: To insure that dam removals intended to benefit migratory fish do not harm endangered mussel and non-migratory fish communities support research aimed at further elucidating the relationship between dam removal and endangered mussel and non-migratory endangered fish and amphibians.
- Objective 3.5: (*Outcome-based Monitoring*) Monitor the effectiveness of conservation delivery efforts.
- Strategy 3.5.1: Use State recreational and commercial fishery status reports from the NC Division of Marine Fisheries and NC Wildlife Resources Commission to gauge improvements in migratory fish populations as a result of conservation delivery in this goal.
- Strategy 3.5.2: Use Museum, Natural Heritage and Section 6 reports to document recolonization of historical habitat by rare aquatic species as a consequence of the conservation delivery in this goal.
- Strategy 3.5.3: Consult with the Atlantic States Marine Fisheries Commission and the South Atlantic Fisheries Management Council to see how the NC portion of their mission is augmented by the conservation delivery in this goal.
- Objective 3.6: Conduct public outreach on conservation delivery and outcomes.
- Strategy 3.6.1: Work with and support programs such as Shad in the Schools Program lead by the NC Museum of Natural History.
- Strategy 3.6.2: Distribute public outreach material including fact sheets, video and reports by making them available on the internet.
- Strategy 3.6.3: Encourage publication of assumption driven research relating to this goal in the peer reviewed scientific literature.
- Objective 3.7: Consider and as appropriate address the effects of climate change on fish habitat restoration efforts.

- Strategy 3.7.1: Assess the degree to which dam removal and fish passage allow fish to better acclimate to climate change by allowing migration between habitat types from the sea to inland habitats.
- Strategy 3.7.2: Assess the degree to which conservation delivery targets such as restoring and improving habitat and population strength allow greater species resilience (healthy populations are better equipped to handle the stress of climate change)
- Strategy 3.7.3: Assess the degree to which water flows are affected by climate change and the effects of any such effects on aquatic resources.