ATLANTIC SALMON RESEARCH NEEDS

NOAA's National Marine Fisheries Service
Northeast Regional Office, Protected Resources Division

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WORKING MATRIX

Background

Atlantic salmon in all U.S. rivers from the Androscoggin River in south western Maine to the Dennys River in eastern Maine are listed as endangered species under the federal Endangered Species Act (ESA). The fish in these waters make up the Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon. NOAA's National Marine Fisheries Service (NMFS) has identified the following research priorities for Atlantic salmon that will provide important information to inform management and guide recovery efforts for the GOM DPS of Atlantic salmon.

NMFS/USFWS Jurisdiction

NMFS shares jurisdiction for Atlantic salmon with the U.S. Fish and Wildlife Service (U.S. FWS). In order to increase effectiveness and efficiency, the Federal agencies have divided responsibility for the species. NMFS is responsible for management and research related to dams and the estuarine and marine phases of the salmon's life history. Thus, these research priorities apply only to those areas. For information on research and management relating to the freshwater components of the salmon's life history, please visit the U.S. FWS website: http://www.fws.gov/northeast/index.cfm.

For further information or questions: Please visit the Atlantic Salmon Recovery Program website at http://www.nero.noaa.gov/prot_res/altsalmon/.

Research Topic	Research Hypothesis	Rationale for Activity
Estuarine and Diadromous Fish		
	River herring provide a prey buffer to migrating Atlantic salmon smolts.	The migrations of Atlantic salmon smolts and river herring overlap in time and space. With similar body size, numbers that exceeded salmon smolt populations by several orders of magnitude (Smith, 1899; Munroe, 2002), and a higher caloric content per individual (Schulze, 1996), river herring were likely a substantial preety buffer that protected salmon smolts from native predators such as double-crested cormorants (*Phalacrocorax auritus*), river otters (*Lontra canadensis*), and ospreys (*Pandion haliaetus*) within sympatric migratory corridors (Mather, 1998; USASAC, 2004). Conversely, reductions in river herring populations increase the smolts' predation risks and may lead to reductions in adult returns.
	American shad (*Alosa sapidissima*) provide a prey buffer to pre-spawn adult Atlantic salmon.	Pre-spawn adult shad would enter these same rivers and begin their updstream spawning migration at approximately the same time as adult salmon. Historically, shad runs were considerably larger than salmon runs (Foster and Atkins, 1869; Stevenson, 1899). Thus, native predators of medium to large size fish in the estuarine and lower river zones could have preyed on these 1.5 to 2.5 kg size fish readily.
Somatic Energy Reserves		
	Atlantic salmon smolts that encounter multiple fishways and/or fish bypass facilities during their migration will experience reduced energy levels, compromising estuarine and marine survival.	In many rivers, Atlantic salmon smolts must pass at least one dam to successfully complete their migrations. We seek information to determine whether or not the use of fishways and fish bypass facilities significantly reduces their somatic energy levels. If fishways and fish bypass facilities reduce somatic energy levels, we seek information on whether reduced somatic energy reserves compromises survival of smolts entering the estuary and marine environment.

Dams		
	Atlantic salmon smolts and kelts must pass multiple hydroelectric dams during their downstream migration in the Penobscot, Kennebec, and Androscoggin Rivers. Cumulative injury and delay experienced by smolts and kelts at these dams is compromising estuarine and marine survival.	Passage at hydroelectric dams is known to cause injury, death, and delay of Atlantic salmon. While a single passage event at a dam may not significantly impair a salmon's ability to survive entry into estuarine and marine habitats, the cumulative effects of downstream passage at dams is likely compromising the Atlantic salmon's ability to survive the challenges of transitioning to marine habitat.
Artificial Propagation		
	Rearing fish in captivity could lead to deleterious effects to wild populations.	Recovery programs strongly dependent on hatchery reared individuals to supplement and recover natural populations have shown limited success for complex species such as salmon. Complex life history strategies of anadromous Atlantic salmon have been refined over time through natural evolution and by the natural environment. Artificial rearing and propagation reduces this generational timeline and leads to abrupt changes in genetic composition and behavior of individuals due to relaxed selective pressures during breeding and rearing fish at high densities in artificial environments. In addition, the lack of diverse surroundings and reduced stimulus found in hatcheries could influence behavior of released individuals making them less fit for survival in the wild. Further, interactions with aquaculture origin fish on specific rivers may have had some impact within this population. Therefore, understanding the limitations of hatchery supplementation and historic influences from aquaculture interactions could increase the utility of the conservation hatchery program and further recovery of wild Atlantic salmon.
Additional Research Priorities		
	We encourage research proposals that will help us further understand the importance of barriers on the continued health and survival of Atlantic salmon. We encourage research proposals that will provide guidance and recommendations on actions that will contribute significantly to the survival & recovery of Atlantic salmon. Additional research priorities can be found at: http://www.seagrant.umaine.edu/program/nmfs-nearshore-salmon-ecology.	