NOAA FISHERIES

SPECIES *in the* SPOTLIGHT

Priority Actions: 2016-2020

Atlantic Salmon

Salmo salar

SPECIES SPOTLIGHT BACKGROUND

The 5-year action plan is part of a strategy to marshal resources on species listed under the Endangered Species Act of 1973 (ESA) for which immediate, targeted efforts are vital for stabilizing their populations and preventing their extinction. Eight species were identified by the National Marine Fisheries Service (NMFS) as among the most at-risk of extinction:

- Atlantic Salmon Gulf of Maine Distinct Population Segment (DPS)
- Central California Coast Coho Evolutionarily Significant Unit (ESU)
- Cook Inlet Beluga Whale DPS
- Hawaiian Monk Seal
- Pacific Leatherback Sea Turtle
- Sacramento River Winter-run Chinook ESU
- Southern Resident Killer Whale DPS
- White Abalone

These species were identified as among the most at-risk of extinction based on three criteria (1) endangered listing, (2) declining populations, and (3) are considered a recovery priority #1[1]. We know the threats facing these species and understand the management actions we can take that will have a high probability of success. The 5-year action plan builds upon existing recovery or conservation plans and details the focused efforts needed over the next 5 years to reduce threats and stabilize population declines. We will engage our partners in the public and private sectors in actions they can take to support this important effort. We will report on our progress through the Biennial Report to Congress and post updates on our website: http://www.nmfs.noaa.gov/pr/.

This strategy will guide agency actions where we have the discretion to make critical investments to safeguard these most endangered species. The strategy will not divert resources away from the important and continued efforts to support all ESA-listed species under our authority. Many of our species have long-standing conservation programs supported by multiple partners. We remain committed to those programs. This action plan is designed to highlight the actions that can be taken by us, other federal and state resource agencies, environmental organizations, Native American Tribes and other partners to turn the trend around for this species from a declining trajectory to a trajectory towards recovery.

[1] Priority #1 is defined as a species whose extinction is almost certain in the immediate future because of a rapid population decline or habitat destruction, whose limiting factors and threats are well understood and the needed management actions are known and have a high probability of success, and is a species that is in conflict with construction or other developmental projects or other forms of economic activity. NMFS Endangered and Threatened Listing Recovery Guidelines (55 FR 24296, June 15, 1990).

ATLANTIC SALMON STATUS

In 2015, NMFS announced a new program to focus and redouble its efforts to protect some of the species that are currently among the most at risk of extinction in the near future. The effort is called the "Species in the Spotlight: Survive to Thrive" initiative, a concerted agency-wide effort to spotlight and save these highly at-risk species. This initiative includes targeted efforts vital for stabilizing their populations and preventing their extinction. The approach involves intensive efforts by us and our recovery partners to stabilize these species. Our goal is to reverse their declining trend so that the species will become a candidate for recovery in the future.

The Gulf of Maine DPS of Atlantic salmon was selected as one of the eight species under this initiative because of their current critically low abundance and a continuing declining trend in abundance. Atlantic salmon are anadromous fish, spending the first half of their life in freshwater rivers and streams in Maine and the second half maturing in the seas between Northeastern Canada and Greenland. In the United States, Atlantic salmon populations historically extended as far south as Long Island Sound. However, the southern populations have all been extirpated and today, the *only* remaining population of Atlantic salmon in U.S. waters exists in just a few rivers and streams in central and eastern Maine. Extinction from the United States is, therefore, a growing concern.

Some populations in Canada are also experiencing significant, ongoing declines, and as a result, the Canadian Department of Fisheries and Oceans established a Ministerial Panel to address concerns over the status of Atlantic salmon in Canada. Additionally, some populations in Europe are also declining substantially. Thus, there is concern regarding the status of this species globally.

In the last several decades, substantial progress has been made to better understand how the loss of biological diversity through species' extinctions affects how ecosystems function and thus, how society is affected by these losses. According to Limburg and Waldman (2009), the term "ecosystem goods and services" (Daily et al. 1997; Ruffo and Kareiva 2009) is used to demonstrate the value and benefits to humans of the natural world. These authors define ecosystem services as "natural ecological functions or properties that support human well-being either directly or indirectly." Abundant diadromous fish populations offer a variety of ecosystem goods and services such as providing a source of food for people, linking freshwater and marine ecosystems, and supporting marine food chains that are desirable to society (Limburg and Waldman 2009). For example, many diadromous species are now recognized as important prey items for commercially valuable fish like haddock and cod (Ames 2004). The declines of many diadromous species are now thought to have contributed (in part) to the declines of nearshore stocks of cod in the Gulf of Maine (Ames 2004).

Atlantic salmon are an integral component of these formerly well-connected ecosystems. These connections between freshwater, estuarine, and marine ecosystems can be re-established and must be if we are to stem the tide of extinction of salmon and potentially other diadromous fish. Many of the rivers of Maine offer the last best hope of recovering not only the Atlantic salmon but many other species of imperiled diadromous fish. In a survey of restoration potential for east coast rivers, Martin and Apse (2011) note the tremendous potential of many rivers in Maine (most notably, the Penobscot) relative to others on the east coast. Thus, restoring connections in salmon rivers in Maine will serve us well if we wish to prevent further declines and potential extinctions of other diadromous species.

Atlantic salmon have long been considered a "canary in the coal mine." When a river is clean and well connected, its salmon population is typically in good shape. When salmon populations are abundant, they can support lucrative recreational and commercial fishing opportunities. Atlantic salmon are also are of great cultural importance to Native American Tribes in Maine and historically supported important sustenance fisheries for the Tribes. If this iconic species goes extinct, the extensive services it once provided to the American people will be lost forever.

ATLANTIC SALMON KEY CONSERVATION EFFORTS/ CHALLENGES

In 2009, the National Marine Fisheries Service and the U.S. Fish and Wildlife Service listed the Gulf of Maine DPS of Atlantic salmon as an endangered species. The final listing rule highlights the importance of dams and marine survival as causes of the current demographic plight of Atlantic salmon. Dams, the inadequacy of existing regulatory mechanisms for dams, and low marine survival were the three primary factors for listing the Gulf of Maine DPS of Atlantic salmon as endangered. The population level effects of dams are acute and well documented:

- Dams directly limit or block access to otherwise suitable habitats.
- Dams directly kill or injure a significant number of salmon on upstream and downstream migrations.
- Dams degrade the productive capacity of habitats upstream by inundating free-flowing rivers, reducing water quality and changing fish communities.
- Dams compound the effects of climate change by limiting Atlantic salmon's access to cool water habitats that are most prevalent in higher elevation areas in northern and western Maine.

Due to the tremendous collaborative effort and work of the state of Maine (particularly Maine's Department of Marine Resources), the Penobscot Indian Nation, a broad coalition of non-governmental organizations, the federal agencies, and Maine's congressional delegation, significant and meaningful accomplishments have been made in restoring the ecosystems upon which the Gulf of Maine DPS of Atlantic salmon depends. Specifically, numerous barriers that

block or impair access to Atlantic salmon spawning and nursery habitat have recently been removed.

Since 1988 (representing a period of time when salmon management was shifting from sustaining a recreational fishery to conservation and restoration of a species that was in decline), 25 dams in the current range of endangered Atlantic salmon have been removed. Twenty of those removals occurred since salmon were first listed as endangered in 2000, 13 of those occurred since 2009 when the range of endangered salmon was expanded. Two of these were major hydroelectric projects removed as part of the Penobscot River Restoration Project; Great Works Dam (removed in 2012) and Veazie Dam (removed in 2013). The Penobscot River is home to roughly 75% of adult Atlantic salmon returns in the U.S. Since 1988, dam removals have restored access to over 1,000 km of rivers and streams that are now entirely free of dams. In other areas, dam removals have reduced the number of dams that salmon and other diadromous fish must navigate through to access high quality habitats. This reduces the cumulative effects that fish populations experience when attempting to navigate up or downstream past multiple dams.

Barrier removals have resulted in meaningful, substantial benefits to the co-evolved suite of diadromous fish in Maine, in addition to Atlantic salmon. For example, following the removal of Fort Halifax Dam (2008) and the Edwards Dam (1999), documented returns of river herring to the Kennebec River have increased from less than 100,000 in 2006 to more than 2,150,000 in 2015. There are also positive signals in other areas where dam removals have occurred. Following the removals of Great Works and Veazie Dams on the Penobscot River (and improved passage at other upstream dams), documented returns of river herring have increased from 2,000 in 2011 to an estimated 585,000 in 2015. American shad are now able to pass Milford Dam (now the first dam on the Penobscot River) with roughly 2,000 passing through the Dam in 2015. This is the first time in over 100 years that American shad have migrated upriver of Milford Dam as Veazie Dam was nearly a complete barrier to upstream migration for the species.

One of the primary purposes of the Endangered Species Act is to conserve the ecosystems upon which endangered and threatened species rely. A fully functioning riverine ecosystem (e.g., an ecosystem in which the co-evolved diadromous species such as sturgeon, rainbow smelt, river herring, shad, sea lamprey and American eel are abundant and resilient) is essential to the recovery of Atlantic salmon. Additionally, a fully functioning marine ecosystem is also essential as this species spends up to several years feeding and growing in the marine environment.

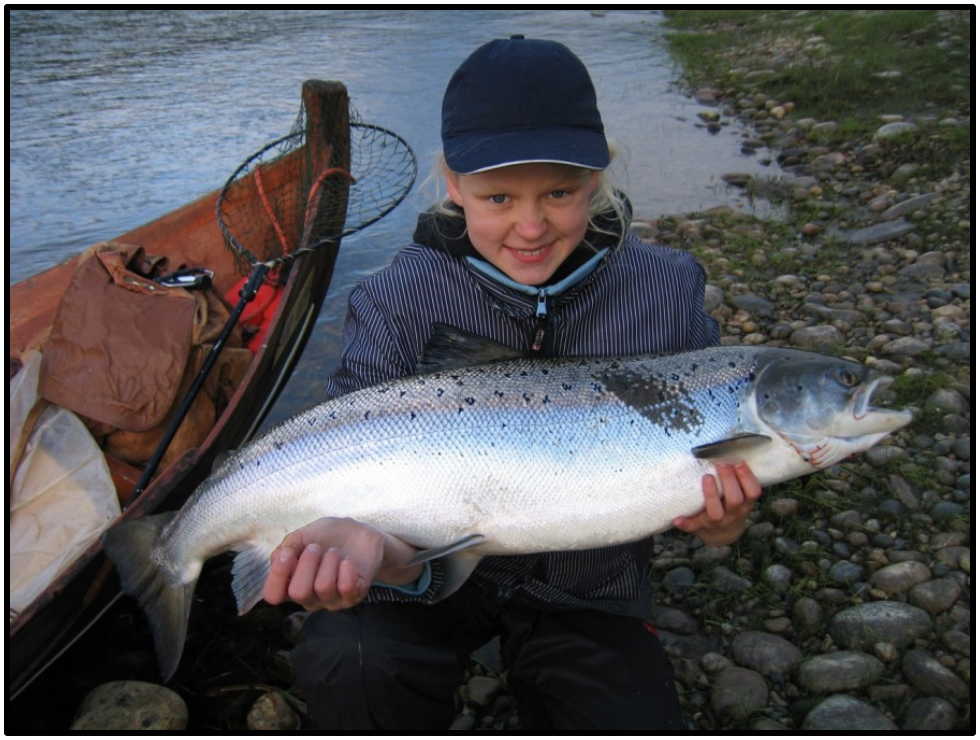
Accumulating scientific evidence suggests that the co-evolved suite of diadromous fish noted above can provide benefits to the Gulf of Maine DPS of Atlantic salmon by providing important ecological services at key junctures in the Atlantic salmon life cycle. These services include serving as prey for salmon directly (rainbow smelt), “conditioning” rearing and spawning habitats by redistributing gravel while digging nests that subsequently reduce embeddedness caused by fine sediments (sea lamprey), serving as alternative prey for predators of salmon (river

herring), and finally by delivering nutrients and energy from the marine environment to freshwater habitats (river herring, American shad, sea lamprey and other species). Although some of these services remain untested hypotheses, recent studies have confirmed that many of these services are provided by these other diadromous species and likely are beneficial for salmon. Restoration actions (such as dam removals and fish passage improvements) are therefore critical for the recovery of the suite of diadromous species and the ecosystem functions they perform.

Despite many recent restoration success stories, more than 90% of rivers and streams in the Gulf of Maine DPS remain impacted from the effects of dams. In Maine, only 8% of salmons' historic salmon spawning and rearing habitat is currently unimpeded. Over 400 dams still exist along the rivers and streams that currently support Atlantic salmon in Maine and only 75 of these have fishways. Even at dams where fishways have been constructed, Atlantic salmon are often unable to find fishway entrances, leading to substantial delay and mortality during their migration. Salmon may also experience mortality from increased predation around dams. Dams also directly injure and kill migrating salmon (and other species); these problems are particularly acute at dams with hydro-electric turbines. Recent information also suggests that the experience of individual salmon in rivers may affect the likelihood of a successful transition to the marine environment. In particular, salmon that have been injured or had to expend energy passing over multiple dams may not be as fit when they enter the marine environment and may be more prone to predation.

Mandatory passage and survival criteria for Atlantic salmon are being established and implemented at many of the hydropower facilities within the range of the Gulf of Maine DPS and are expected to be achieved at most facilities over the next five years. This will require dam owners to implement significant design modifications at five mainstem dams on the Kennebec River and seven mainstem dams on the Penobscot River. These survival standards will require nearly all hydropower projects located in salmon habitat to achieve more than 95% upstream and downstream survival through their facilities using whatever means are necessary. Before these criteria were established, survival at hydropower facilities ranged from an estimated 45 to 85%.

High mortality rates in the marine environment represent an ongoing and significant threat to the species. The threats associated with low marine survival have propelled already low populations of Atlantic salmon in U.S. waters to the point of near extinction. International efforts to control and better manage foreign fisheries to reduce the impacts of these fisheries on Atlantic salmon of U.S. origin are ongoing primarily through the North Atlantic Salmon Conservation Organization (NASCO). Not all of the causes of low marine survival are well known. Threats like climate and ocean regime changes, shifts in predator and prey abundance and distribution (and even energy content of one key prey item – capelin) appear to be important factors influencing salmon survival at sea. Efforts to better manage capelin in an ecosystem management plan are underway.



A large Atlantic salmon harvested from the Teno River in Northern Finland. The Teno River is among the most productive Atlantic salmon rivers in the world maintaining vibrant recreational and commercial fisheries.

KEY ACTIONS NEEDED 2016-2020

The key actions that follow represent a small subset of the recovery actions identified in the draft recovery plan, which is scheduled to be published in 2016, and represent actions NMFS and partners can take in the next five years to promote recovery of the species. The partners identified below have indicated their interest in helping achieve the action, but are not committed to a specific activity or commitment of resources. This list is not comprehensive of all potential partners, and we welcome partnering with others not identified within this plan.

Reconnect the Gulf of Maine with Headwater Streams

Description and Background: Atlantic salmon require a diverse array of well-connected habitat types. In freshwater, dams, culverts, and other barriers to migration have limited access to important spawning and nursery habitats, particularly "thermal refugia" that salmon routinely seek out in summer when temperatures rise. Since Atlantic salmon require cool water throughout the summer, they need access to cooler waters. High quality habitats, including cool water rivers and tributaries still exist throughout the state of Maine; however, the Gulf of Maine DPS of Atlantic salmon only has unimpeded access to 8% of its historic freshwater habitat. This means that it is often difficult or impossible for Atlantic salmon to access important habitats. Restoring access to as many habitats as possible within the range of the DPS will make this species more resilient to the effects of climate change. In order to recover salmon, it is essential that connections among these habitats and the Gulf of Maine be restored. The productivity of salmon in freshwater can be increased by restoring connectivity in a variety of ways.

We need to remove barriers and improve road crossings that prevent or impair the ability of salmon to move through waterways. When done correctly, these projects will increase ecosystem and infrastructure resilience to changing environmental and climatic conditions. Private and municipally-owned dams and undersized road crossings significantly degrade the quantity, quality, and accessibility of federally designated critical habitat for Atlantic salmon. Many dams, road crossings and land use practices were legally constructed or implemented according to state laws. Recent surveys of many road crossings have found that many are partial or full barriers to Atlantic salmon, and therefore are insufficient in affording adequate protection to endangered Atlantic salmon. Today's infrastructure design methods for "fish friendly" road crossings are more resilient to catastrophic events such as flooding, but it is expensive to remove, repair or replace existing barriers and road crossing and the costs are out of reach for many landowners and municipalities.

Many of the small, non-hydropower dams that remain in Maine were constructed in the late 1800s and early 1900s to support log drives or power mills. Most of these dams prevent Atlantic salmon and other ecologically and economically important diadromous fish such as river herring and American eels from accessing important habitats. Many of these small dams in Maine lie dormant, have deteriorated significantly, and are identified by Maine's Emergency Management Agency as being a hazard to critical infrastructure and possibly lives. Resources are needed to remove dams or otherwise restore fish passage at dams and road crossings. Dams that no longer support communities' needs should be prioritized for removal. These smaller barriers are pervasive throughout the state of Maine and we cannot address all of them by ourselves. We need our partners such as Project SHARE, The Nature Conservancy, Maine Audubon, the

Penobscot Indian Nation, and the Atlantic Salmon Federation to continue and expand their efforts to address this significant threat in a meaningful way.

We need to reduce the effects of hydro-electric dams that prevent or delay salmon and other diadromous fish from accessing freshwater habitat and the Gulf of Maine. In the next five years, five dams in the freshwater range of the Gulf of Maine DPS of Atlantic salmon will come up for relicensing: Weldon Dam on the Penobscot, the Ellsworth and Graham Station Dams on the Union River, and Shawmut and Williams Dams on the Kennebec River. The relicensing process elevates these dams as a top priority as this process affords a unique opportunity to consider and address impacts from the dams on Atlantic salmon and other diadromous species. These facilities are a significant impediment to upstream and downstream passage of all diadromous fish, including Atlantic salmon. During the relicensing process, we will use our authority under the ESA to establish performance (survival) standards at these facilities. In addition, we will exercise our authority for fish passage under the Federal Power Act to ensure effective fish passage for all diadromous fish, particularly river herring and American shad that are integral to supporting fully functioning ecosystems upon which salmon depend.

Given the large number of dams in Maine, we need the help of our partners to address this issue. We know this multi-party approach can be successful at making meaningful changes. For example, on the Penobscot River, a coalition of environmental organizations, state and federal resource agencies, Native American Tribes and others achieved great success in working to restore the lower Penobscot River through two mainstem river dam removals and the construction of a bypass around a third. This type of concerted partnership is needed to make significant progress in addressing the threat posed by dams in Maine. Examples of the significant impacts that smaller scale dam removals have had on restoring diadromous fish ecosystems include places like Sedgeunkedunk Stream where two dams were removed as part of a restoration project to improve fish passage and restore diadromous fishes. The upper dam was replaced with a rock-ramp fish-way and the lower dam was removed leading to significant improvements to diadromous fish passage in the watershed. Projects such as these need to continue in order to reduce the threat posed by dams to Atlantic salmon, and we need help from our partners to address passage issues at as many dams as possible over the next five years.

Expected Benefits to the Species:

a) Restore the productive capacity of freshwater habitats by restoring free flowing rivers, water quality, and fish communities altered by the dams, road crossings, and other barriers;
b) Increase resilience from the negative impacts from climate change by improving connectivity within watersheds and providing salmon with access to thermal refugia.

Source: Recovery Plan references will be provided upon the release of the Draft Recovery plan

Location: Maine

NMFS Point of Contact: Dan Kircheis, Protected Resources Division, Greater Atlantic Regional Fisheries Office, Maine Field Station, Dan.Kircheis@noaa.gov, 207-866-7320; Matt Bernier, NOAA's Restoration Center, Maine Field Station, Matthew.Bernier@noaa.gov, 207-866-7409

Partners: The Nature Conservancy, Maine Audubon, Atlantic Salmon Federation, Project SHARE, Penobscot Indian Nation, Passamaquoddy Tribe, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Maine Department of Transportation, Landowners and Municipalities, Federal Energy Regulatory Commission, and dam owners within the freshwater range of the Gulf of Maine DPS.

Proposed Start Date: 2015

Expected Completion Date: 2050

Current Status: Ongoing

Updates: Updated annually end of each fiscal year

Resources:

Funding:

Project costs - $20 million (5 Million per year for 5 years); Administrative costs - $500,000 ($100,000 per year for 5 years). Currently funded at $500,000 for fiscal year 2016.

Opportunities for Partners:

- We encourage the State of Maine, Tribal governments and non-governmental organizations to seek opportunities for dam and other barrier removals and/or projects to improve fish passage.
- We encourage the Federal Highway Administration, the U.S. Army Corps of Engineers, and the U.S. Department of Agriculture to use their authorities, including 7(a)(1) of the ESA to carry out programs within their authority for the conservation of endangered Atlantic salmon
- We also encourage the State of Maine, Tribal Governments, municipalities and partners to apply to funding initiatives (e.g. Section 6) to implement restoration programs for the conservation and restoration of diadromous fish, particularly Atlantic salmon.
- We encourage all partners (e.g. Atlantic Salmon Federation, Trout Unlimited, American Rivers) to participate in the negotiations with dam owners to ensure that every effort to restore passage at dams within the DPS is undertaken and provide comments on documents made available through the Federal Energy Regulatory Commission process.
- We encourage Federal Energy Regulatory Commission to use their authorities, including 7(a)(1) of the ESA, to carry out programs within their authority for the conservation of endangered Atlantic salmon.

- We encourage landowners to remove or provide passage around blockages, including culverts and dams that prevent or impair the movement of Atlantic salmon and Maine's native fish community.

Increase the Number of Fish Successfully Entering the Marine Environment

Description and Background: In addition to restoring connectivity between marine and freshwater habitat, we need to get more smolts successfully out of the rivers and into the marine environment. Maximizing smolt production has been identified as the primary safety net for Atlantic salmon during periods of low marine survival. Wild smolt production remains low for a variety of reasons including problems with connectivity (see Action 1) and habitat quality. Historical practices such as log drives, unsustainable forestry, agriculture, and land use practices, pollution, and road networks damaged rivers and tributaries. The legacy of these impacts is straightened and simplified stream channels, embedded substrates, reduced off-channel habitat, and diminished access to and connectivity with thermal refugia. This damage not only impacts current smolt production but reduces the resilience and thermal refugia available to future populations. Fortunately, current land management practices and riparian conservation corridors have reduced most of these threats and provide an opportunity for partnerships in the restoration of natural watershed-level stream processes.

In the short term, smolt production may be increased by making changes to hatchery and stocking practices (e.g., targeting currently vacant habitat). This can help to temporarily offset the losses experienced from ongoing threats. However, to successfully recover Atlantic salmon, in addition to reconnecting stream segments (Action 1), efforts must be focused on protecting remaining high quality stream segments and ensuring that freshwater habitats function to support all life stages. The principles of process-based restoration were described by Beechie et al. (2010), which highlighted four process-based restoration principles that ensure sustainable river restoration: (1) restoration actions should address the root causes of degradation, (2) actions must be consistent with the physical and biological potential of the site, (3) actions should be at a scale commensurate with environmental problems, and (4) actions should have clearly articulated expected outcomes for ecosystem dynamics.

Activities that are consistent with these principles (such as protecting headwater areas and restoring access to as many habitats as possible within the range of the DPS) should also help the species become more resilient to climate change. Over time, following this strategy should allow riparian corridor function to recover and lead to greater habitat complexity. These more complex habitats should provide thermal refuges which are needed for summer shelter, and decreasing the

spacing between these habitat features should increase summer survival. Similarly, complex habitat in pools also increases overwintering habitat.

We need our partners such as U.S. Fish and Wildlife Service, Project SHARE, The Nature Conservancy, Maine Audubon, the Penobscot Indian Nation, and the Atlantic Salmon Federation to continue and potentially expand their efforts to address both restoration of watershed processes and work to increase smolt production in natural systems in a significant manner to increase the pace of recovery.

Expected Benefits to the Species:

a) Restore smolt production capacity of freshwater habitats through process-based restoration.
b) Increase production of naturally-reared smolts in all critical habitat including those above current barriers to create productive populations.
c) Increase abundance of native freshwater and diadromous fish by restoring properly functioning ecosystems; thereby, reestablishing the ecosystem services these species provide to Atlantic salmon.

Source: Recovery Plan references will be provided upon the release of the Draft Recovery plan
Location: Maine
NMFS Point of Contact: Dan Kircheis, Protected Resources Division, Greater Atlantic Regional Fisheries Office, Maine Field Station, Dan.Kircheis@noaa.gov, 207-866-7320
Lead Partners: U.S. Fish and Wildlife Service, Army Corp of Engineers, U.S. Department of Agriculture Natural Resources Conservation Service, Penobscot Indian Nation, Landowners and Municipalities
Partners: National Fish and Wildlife Foundation, The Nature Conservancy, Maine Audubon, Atlantic Salmon Federation, Project SHARE,
Proposed Start Date: 2015
Expected Completion Date: 2050
Current Status: Ongoing
Updates: Updated annually end of each fiscal year
Resources:

Funding:

Project costs - $500,000 ($100,000 per year for 5 years)

Opportunities for Partners:

- We encourage the State of Maine, Tribal governments and non-governmental organizations to seek opportunities for watershed level restoration of natural stream processes and other projects to improve natural fish production.
- We encourage U.S. Fish and Wildlife Service, the State of Maine, and non-governmental organizations to increase the overall production of Gulf of Maine DPS

stocks to enable full utilization of all critical habitat for natural smolt production bolstering both genetic conservation resources and overall abundance of freshwater stages.

- We encourage the Federal Highway Administration, the U.S. Army Corps of Engineers, and the U.S. Department of Agriculture to use their authorities, including 7(a)(1) of the ESA to carry out programs within their authority for the conservation of endangered Atlantic salmon.
- We also encourage the State of Maine, Tribal Governments, municipalities and partners to apply to funding initiatives (e.g. Section 6) to implement restoration programs for the conservation and restoration of diadromous fish, particularly Atlantic salmon.

Reduce International Fishery Mortality in West Greenland

Description and Background: At the 2015 NASCO Annual Meeting, a new three-year regulatory measure (2015-17) was implemented for the mixed stock salmon intercept fishery at West Greenland. Unfortunately, the measure does not include an agreed upon catch limit. Greenland unilaterally set a 45 ton quota for all components of the fishery for fishing seasons 2015, 2016, and 2017. The provisional catch estimate for the West Greenland fishery in 2014 was 57.8 t, which does not include unreported catch. Of this catch, 35 t were reported as being sold to factories, 11.8 t were harvested and sold locally, and 11 t were harvested for private consumption. At the 2015 NASCO Annual Meeting, the findings of a telephone survey of harvesters who participated in the 2014 fishery were presented. The results from this survey indicate that there was a high degree of non-reporting resulting in an underestimate of the total harvest, with an actual harvest potentially as high as 96t. The new 2015-17 regulatory measure will maintain the prohibition on exports of Atlantic salmon from Greenland and requires Greenland to implement new, stronger monitoring, control, and reporting measures. The new measure includes a provision indicating that if any overharvest of the unilateral catch cap occurs in a particular year, it will result in an equal reduction in the catch limit for the following year, and any under-harvest cannot be carried forward to a future year. Upon adoption of the measure, the United States called for a review of the provisions of the measures during an intersessional meeting to be held prior to NASCO's 2016 Annual Meeting.

Expected Benefits to the Species:

- Reduce to the maximum extent possible directed harvest of U.S. origin salmon
- Increase marine survival and thereby, the number of healthy adult returns to U.S. rivers

Source: Recovery Plan references will be provided upon the release of the Draft Recovery plan

Location: West Greenland
NMFS Point of Contact: Rory Saunders, Protected Resources Division, Greater Atlantic Regional Fisheries Office, Rory.Saunders@noaa.gov, 207-866-4049.
Lead Partners: NMFS, U.S. Department of State
Partners: Maine Department of Marine Resources, Atlantic Salmon Federation
Proposed Start Date: 2013
Expected Completion Date: 2018
Current Status: The U.S. continues to negotiate with the government of Greenland and participants of the fishery, other Parties to NASCO's West Greenland Commission, and other concerned organizations both within and outside of NASCO to ultimately establish agreed upon measures that will minimize to the maximum extent possible the impact of the fishery on U.S. origin fish.
Updates: Updated annually end of each fiscal year
Resources:

Funding:

N/A

Opportunities for Partners:

- We encourage the government of Greenland and participants of the fishery, other Parties to NASCO's West Greenland Commission and other concerned organizations both within and outside of NASCO to continue to work collaboratively to minimize the impact of the intercept fishery on U.S. origin fish.

Increase Our Understanding and Ability to Improve Survival in the Marine Environment

Description and Background: Our assessment of the mortality of Atlantic salmon in fisheries will include quantifying US-origin fish in distant water fisheries and quantifying impacts on recovery potential to support US negotiations at NASCO. Natural marine survival will be assessed and management advice implemented by a) monitoring smolt production and adult returns; b) indexing estuary and coastal mortality and identifying location, intensity, and causes of high mortality; c) describing return migration of sub-adults from West Greenland; and d) quantifying and addressing the impacts of the reduced abundance and fitness of capelin, the primary prey resource for Atlantic salmon in the marine environment.

The marine environment that North American Atlantic salmon occupy is vast extending from the Maine coast through Canada to Greenland. It is very difficult to study the limited number of fish leaving Maine rivers in this vast expanse of ocean and therefore, success in better understanding

what is affecting marine survival requires that we work with our partners both domestically and internationally.

Expected Benefits to the Species:

- Gauge the effectiveness of restoration actions and conservation measures.
- Facilitate adaptive management based on the best available science.
- Prescribe conservation measures that allow for salmons' survival and recovery.

Source: Recovery Plan references will be provided upon the release of the Draft Recovery plan
Location: Northwest Atlantic Ocean
NMFS Point of Contact: John Kocik, Northeast Fisheries Science Center, John_Kocik@noaa.gov, 207-866-7341.
Lead Partners: Maine Department of Marine Resources
Partners: U.S. Fish and Wildlife Service, Canada's Department of Fisheries and Oceans, Ocean Tracking Network, NASCO, Northwest Atlantic Fisheries Organization, Bureau of Ocean Energy Management, the U.S. Navy
Proposed Start Date: 2016
Expected Completion Date: 2020
Current Status: Ongoing
Updates: Updated annually end of each fiscal year
Resources:

Funding:

- Additional resources for monitoring and assessment, including ocean tracking and survival are needed
- Invest human resources to consider including Atlantic salmon in the Northwest Atlantic Fisheries Organization ecosystem management plan for forage fish (which includes capelin)

Opportunities for Partners:

- We encourage the governments of Canada, Greenland, and other Parties to NASCO, the Northwest Atlantic Fisheries Organization, and other concerned organizations both within and outside of NASCO to continue to work to address mortality of North American origin fish in distant water fisheries and minimize the impacts on the most at risk stocks.
- We encourage the U.S. Fish and Wildlife Service, Bureau of Ocean Energy Management, and U.S. Navy to collaborate with the State of Maine on a monitoring and assessment program to assess mortality of US-origin fish in distant water fisheries and quantify impacts on recovery potential.

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January 2016

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