

**Guide
To the Listing of
A Distinct Population Segment
of Atlantic Salmon
as Endangered**

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Atlantic Salmon Overview

Atlantic salmon (*Salmo salar*) is a highly prized food and game fish once found in nearly every major coastal river in New England. Salmon have a complex life history in that they live in both fresh and salt water and they migrate hundreds or thousands of miles. They spend their first one-to-three years inland, in streams and rivers. Eventually they migrate downstream to the ocean, where they may travel as far as the shores of Greenland. After one or two years on the high seas, the adult fish return to their natal streams to spawn.

At one time, salmon populations could be found in at least 34 Maine rivers and 11 major U.S. watersheds outside Maine. A combination of fishing and human-caused changes in the rivers had begun to deplete New England salmon runs by the early 1800s. The last two decades have brought a continuing decline, and today there are only eight Maine rivers in which native salmon are known to be reproducing.

There are other Atlantic salmon populations in some Canadian rivers, in hatcheries, and in aquaculture facilities. But very few salmon are still living successfully in the wild in the United States: in some of the eight Maine rivers, fewer than a dozen adults are returning to spawn each year. These remnant stocks are increasingly threatened by disease, the loss of habitat, escapes from salmon farms, and low survival rates in both freshwater and marine life stages.

The federal agencies responsible for protecting salmon determined in 1999 that the salmon in the eight Maine rivers are close to extinction. In November 1999, the federal agencies proposed protecting these fish under the Endangered Species Act of 1973. After reviewing the public comments submitted in early 2000, the U.S. Fish and Wildlife Service and NOAA Fisheries listed Atlantic salmon as endangered in November 2000.

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Natural History of Salmon

Atlantic salmon spawn in fresh water in the early autumn. The fertilized eggs remain in gravel on the stream bottom until spring, when they hatch and small fish called “fry” emerge. Fry quickly develop into “parr,” a 2- to 3-inch-long fish that remains in freshwater. In New England rivers, it takes parr two or three years to grow large enough to develop into “smolts.” In the smolt stage (approximately six inches long), the young salmon migrate downstream to the ocean.

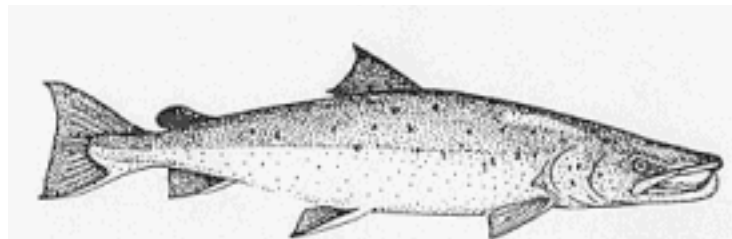
Less is known about the animal’s salt water life, but tagging studies have shown that young salmon migrate as far north as the Labrador Sea during their first summer in the ocean. After their first winter at sea, some of the salmon become sexually mature and return to their natal rivers to spawn. These are referred to as “one sea-winter salmon” or “grilse,” and they are much more common among Canadian stocks than among the salmon in Maine rivers.

Salmon that remain at sea for a second winter feed in coastal waters of Canada and Greenland and grow to approximately 30 inches in length and 8 to 15 pounds. Historically, these two sea-winter fish were caught in commercial gillnet fisheries off Nova Scotia, New Foundland, Labrador, and West Greenland. These fisheries have recently been closed or vastly reduced to

protect the remaining stocks. There has also been recreational fishing for salmon in rivers and estuaries as they return to spawn. In recent years these were limited to catch-and-release fishing; in 2000 recreational fishing was closed altogether (except for an angling fishery on stocked fish farther south in the Merrimack River).

Atlantic salmon can return from the ocean any-time from spring through fall, but the peak “run” is in June. Biologists think the fish use odors to find their home river. Spawning takes place from late October through November. Some salmon return to sea immediately after spawning, but most (80%) spend the winter in the stream and migrate back to the ocean in the spring.

A salmon that has spawned and is still in freshwater is called a “kelt” or “black salmon.” When it returns to salt water and resumes feeding, it regains its silver color and is known as a “bright” fish. A few of these spawners survive another one to two years at sea and return to the river as repeat spawners.



Endangered Species Act "Listing"

The Endangered Species Act of 1973 defines an endangered species as one "in danger of extinction throughout all or a significant portion of its range."

The number of naturally reproducing Atlantic salmon in Maine rivers is at an all-time low, placing these fish in danger of extinction. Endangered Species Act protection was extended to these fish in November 2000.

The decision to "list" the fish was made jointly by the secretaries of Interior and Commerce on November 13, 2000. The listing becomes effective 30 days following the decision. The two departments are jointly responsible because the Interior's U. S. Fish and Wildlife Service is responsible for ESA actions in fresh water and the Commerce Department's NOAA Fisheries is responsible for the ESA in salt water environments.

Factors in deciding whether a species is endangered or threatened

the present or threatened destruction, modification, or curtailment of its habitat or range

overutilization for commercial, recreation, scientific or educational purposes

disease or predation

inadequacy of existing regulatory mechanisms

other natural or manmade factors affecting its continued existence

Effects of "listing" Atlantic salmon under the ESA

* The listing made it illegal to "take" Atlantic salmon from the Gulf of Maine DPS. "Take" means "to harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect."

* The ESA requires that a recovery plan be developed to restore a species to health. The Services will work with the State of Maine to develop and implement a recovery plan. It is expected that the state's Conservation Plan will serve as the basis for the ESA recovery plan. The public will have ample opportunity to comment on the draft recovery plan before it becomes final.

* The ESA requires that all federal agencies consult with the services to ensure that any action authorized, funded, or carried out by any federal agency is not likely to jeopardize the listed salmon.

What the ESA says about a DPS

The ESA considers “any distinct population segment (DPS) of any species of vertebrate fish or wildlife that interbreeds when mature” to be a species.

The ESA extends protection to a DPS in part to preserve genetic diversity important to the species’ survival.

A “distinct population segment” is a population segment that (1) is “discrete” (to some extent separated from the remainder of the species or subspecies), and (2) is “significant (biologically and ecologically).

At one time, Atlantic salmon distinct populations segments probably existed in Long Island Sound and Central New England. Today, the only remaining U.S. Atlantic salmon DPS is in the Gulf of Maine.

The Gulf of Maine DPS includes all coastal watersheds north of, and including tributaries of, the lower Kennebec River (below the former Edwards Dam site) to the mouth of the St. Croix River at the U.S./Canada border. At least eight rivers in the Gulf of Maine DPS range still contain functioning wild Atlantic salmon populations: the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot rivers and Cove Brook.

Some Factors Influencing the Decision To List Atlantic Salmon

the presence of salmon swimbladder sarcoma virus (SSSV) in parr collected from one river and in hatchery-held brood stock

the finding of infectious salmon anemia (ISA) in wild salmon in Canada and in netpen sites ten miles from U.S. waters

the low number of adult salmon returning to spawn in the eight rivers

low survival rates for young salmon in the rivers

continued use of non-North American salmon and detection of aquaculture escapees in Maine rivers, with the potential for interbreeding and competition for habitat and food

Federal Support for Salmon Research and Salmon Protection Programs

The Services are authorized to provide financial assistance toward the recovery of the Atlantic salmon and to assist the State of Maine in this effort. This is done when a cooperative agreement is established with the State to assist in conserving and protecting the species. The Services can allocate funds for recovery proposals from the State. The Services review and rank the proposed projects and fund the highest ranked proposals.

To the State of Maine — The FWS has provided \$2.35 million for Atlantic salmon projects directly to the State of Maine since Endangered Species Act protection was first considered in the early 1990s. Of that, \$1.55 million assisted implementing the State of Maine Atlantic Salmon Conservation Plan, including weir construction, during the past three years.

FWS projects on DPS rivers — Separate from funds provided to the State of Maine, the FWS spent nearly \$6.1 million on projects directly related to the DPS rivers between 1992 and 2000 and expects to spend another \$1.9 million this fiscal year.

FWS projects on Penobscot River restoration — In addition, the FWS has spent nearly \$7.5 million on the cooperative Penobscot River restoration project with the State of Maine during the past eight years and expects to spend another \$1.7 million on it this fiscal year.

The FWS' Craig Brook National Fish Hatchery was redesigned specifically to maintain the Atlantic salmon stocks found in several of the DPS rivers. FWS spent \$12.5 million to

reconstruct Craig Brook, the vast majority of which was spent in the state of Maine.

In addition to the FWS spending on salmon, NMFS spent \$2.3 million in FY 2000 on Atlantic salmon management and research.

Federal support for Atlantic salmon in Maine and in other New England states

Congress appropriates funds to the FWS for several Atlantic salmon programs in New England. The FWS has restoration programs in a number of rivers in the Connecticut and Merrimac River watersheds in addition to Maine. These are called "restoration" programs because the historic populations were extirpated many years ago, mostly during the dam-building era of the Industrial Revolution, and their purpose is to restore fish populations to those watersheds. These programs are different from the hatchery-supported program on several of the DPS rivers, where the Atlantic salmon was never extirpated, and where work is done with the remnant salmon population.

In Maine, FWS funds support the operation of two fish hatcheries and one fishery management assistance office. The FWS endangered species program also provides funding to assist with projects that might help with the recovery of a listed species. Since the Atlantic salmon has not been on the list of endangered species until now, no ESA recovery funds have been available for this purpose.

Genetics and the DPS

Genetics is one tool scientists use to determine how closely populations are related. Genetic analysis was just one of several factors biologists examined to conclude that the salmon in the Maine rivers covered by the listing area represented a distinct population segment. Genetics information by itself does not answer the question of whether a population is distinct under the ESA. To decide whether a population is a “distinct population segment” that can be considered for protection under the ESA, scientists look at two main questions: is the population discrete and is it significant?

The Services determined the wild Gulf of Maine Atlantic salmon are separate, or discrete, from other populations because:

- (1) there is significant reproductive isolation between Maine Atlantic salmon and those in Canada;
- (2) rivers in the DPS have been dominated by naturally produced fish (more than 80 percent) for the past 30 years;
- (3) genetic indices indicate important differences between populations.

In addition, the wild Gulf of Maine salmon are significant because:

- (1) they have traits that make them biologically unique;
- (2) they have persisted in their native range;
- (3) the habitat they occupy is unique for the species.

Two of the most striking features that make them significant are that most of the population spends two years at sea and migrates to West Greenland – one of the longest migration routes in North America.

While genetics is a component of determining whether a population is discrete, it is only one tool used to look at population differences. The history and biology led the federal Biological Review Team to conclude that while “it is unlikely that any U.S. Atlantic salmon populations exist in a genetically pure native form, their continued presence in indigenous habitat indicates that important heritable local adaptations likely still exist.” As such, the Services believe that these are critical remnant populations.

The genetic analysis that contributed to the proposal to list has been publicly available since the spring of 1999. The results of this analysis of DNA taken from salmon within the DPS populations and several Canadian and European populations showed that Atlantic salmon in North America are so genetically distinct from European salmon that they can be distinguished by their DNA with 100 percent accuracy. The difference between the DPS and Canadian salmon is less distinct, as would be expected from their geographic proximity, but differed to the extent that U.S. and Canadian salmon can be separated based on their genetic structure with about 70 percent accuracy. The genetics data support the other findings of the review of the historical persistence and life history attributes of these wild Maine populations, leading to the conclusion that they qualify as a DPS.

The genetic data developed since the 1999 publication of the proposed rule is consistent with the data used to conclude that the Maine wild salmon in eight rivers constitute a DPS.

A Brief History of Protection Efforts

Some major events in the effort to protect Atlantic salmon under the ESA:

November 1991 – The U.S. Fish and Wildlife Service designated salmon in five Downeast Maine rivers as “category 2” candidate species. After the designation, FWS and the State of Maine produced a prelisting recovery plan and began working with the National Marine Fisheries Service to reverse the decline in salmon abundance.

October 1993 – The Services (FWS and NMFS) received petitions (from RESTORE: The North Woods; Biodiversity Legal Foundation; and Jeffrey Elliot) to list Atlantic salmon under the ESA.

January 1994 – The Services published notice that a listing might be warranted, and asked for information from the public. At the same time, the services formed a biological review team to study the status of U.S. Atlantic salmon in relation to the ESA.

January 1995 – The review team produced a report (“Status Review for Anadromous Atlantic Salmon in the United States”) that concluded that a distinct population segment of Atlantic salmon in seven rivers was in danger of extinction. The report was submitted for peer review and made available for public review.

September 1995 – After reviewing state and foreign efforts to protect salmon, the Services concluded that efforts being taken to protect salmon had the potential to reduce the likelihood of extinction and that the Services were therefore able to propose listing the DPS as threatened rather than endangered. The proposed rule offered the state an opportunity to develop a conservation plan.

October 1995 – The governor of Maine appointed a task force to develop a conservation

plan for the protection and recovery of salmon in seven rivers. The state held public hearings on the conservation plan in the fall of 1996 and submitted the plan to the Services in March 1997. The Services invited public comments on the plan in May 1997.

October 1997 – One of the petitioners (RESTORE: The North Woods) filed notice of intent to sue NMFS and FWS to enforce the final listing provision of the ESA unless the services promptly published a determination.

December 1997 – The Services concluded that ongoing actions had reduced the threat to the salmon and that with additional planned actions the seven-river DPS was not likely to become endangered in the foreseeable future and therefore ESA listing was not warranted. The Services also said they would make annual reports on the implementation of the state plan available for public review, and they listed the circumstances under which the process of listing salmon would be re-initiated.

January 1999 – The Services received Maine’s first annual progress report on implementation of the state’s conservation plan.

July 1999 – After reviewing progress reports on the state’s conservation plan and all available information on the status of the species, the biological review team concluded that the DPS is in danger of extinction.

November 1999 – Based on the biological evidence, the Services published a proposal to list Atlantic salmon as endangered. Public hearings were held in January and February, and public comment was accepted until April 14, 2000.

November 2000 -- The secretaries of Interior and Commerce announced that the DPS was listed as endangered.

Questions and Answers

Why is the federal government listing Atlantic salmon?

Q 1: Why did the Services decide to list Atlantic salmon in eight Maine rivers as endangered?

The U.S. Fish and Wildlife Service and the National Marine Fisheries Service did an exhaustive review of the best available scientific and commercial information and determined that Atlantic salmon living in the eight Maine rivers are a distinct population segment that is in danger of extinction and warrants protection under the Endangered Species Act.

The science that led to the Nov. 17, 1999, proposal to list is described in the July 1999 “Review of the Status of Anadromous Atlantic Salmon under the U.S. Endangered Species Act” (<http://news.fws.gov/salmon/asalmon.html>). The Services also considered other information, including comments received during the public comment period; summaries of those comments and responses can be found in the final rule published in the “Federal Register.”

Q2: Why not protect the salmon by continuing to support the Maine Conservation Plan?

Given the situation in the rivers – low numbers of returning adults, lower than expected juvenile survival, continuing threats to salmon habitat – the Services are required to extend to the DPS the protections offered by listing. The Services do not, however, view ESA listing and the Maine plan as an either/or proposition.

FWS and NMFS fully support the Maine plan and expect it to form the foundation for the recovery plan required by the ESA. The listing is a tool to ensure that the federal government will

do all it can to support and supplement state and local efforts to recover the salmon. In particular, the ESA strengthens the protection against the threats identified in the final rule such as those posed by aquaculture operations – the spread of disease and the potential for escaped fish to interact with or compete with wild fish.

The recovery plan required by the ESA must include recovery goals and delisting criteria. It must identify the specific tasks required to recover the DPS, identify the responsible party and assign appropriate deadlines. Progress on implementing the plan will be closely monitored and tracked.

Q3: Which Atlantic salmon are listed?

The listing extends protection to all wild salmon populations in the Gulf of Maine distinct population segment. The Gulf of Maine DPS includes all coastal waterways north of the lower Kennebec and its tributaries (below the former Edwards Dam site) to the mouth of the St. Croix River at the U.S./Canada boundary. Eight rivers in the DPS range are known to contain functioning wild Atlantic salmon populations: the Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap and Sheepscot rivers, and Cove Brook. Additionally, hatchery fish derived from wild broodstock in these rivers are listed.

Q4: Could other rivers in the DPS range be added to the listing?

Yes. Additional populations of wild Atlantic salmon in the DPS range could be identified by the Services, State agencies or members of the public. The Services are gathering information on additional rivers, including the upper Penobscot River and some lower tributaries to the Kennebec River.

A public notification process would be required for the addition of any new river populations to the DPS.

Q5: I thought the ESA was designed to protect animals that are really facing extinction, such as whooping cranes or condors? Isn't protecting a DPS an extension of the ESA's original intent?

No. The phrase "DPS" comes from the ESA. The concept of DPS is used sparingly (only with vertebrates, for instance), but it has been applied previously for various West Coast salmon, Florida panthers, and southern sea otters.

A DPS recognizes the importance of genetic diversity in species and recognizes that protection and recovery of species is dependent on retaining discrete and significant population segments.

Q6: There are millions of Atlantic salmon elsewhere in Maine and Canada. Why is it necessary to protect this population?

There is a practical reason for protecting distinct population segments of endangered animals. Different populations have different traits, and the species needs this variation in order to adapt to environmental changes. Genetic diversity is also useful as a building block of restoration programs.

Bald eagles were listed in the lower 48 states while there were healthy populations of bald eagles in Canada and Alaska. Atlantic salmon are arguably in worse shape than bald eagles were, because wild populations of Atlantic salmon are in trouble throughout their range in the United States and Canada.

The 6 million Atlantic salmon held in captivity in aquaculture facilities are analogous to animals in a zoo. Animals being raised in cages do not give a picture of the status of the species in the wild.

Farmed salmon are bred for production purposes; they do not need and may not have traits that would allow them to live successfully for many generations in the wild.

Not only is it practical to protect this wild DPS of Atlantic salmon, the ESA requires the Services to conserve an endangered species by using all methods and procedures necessary to bring it to the point at which these measures are no longer necessary. The millions of Atlantic salmon elsewhere in Maine and Canada are sustained through artificial propagation and would likely disappear without continued releases. The goal of the recovery plan will be to recover the Gulf of Maine DPS to the point at which it can continue surviving without intervention.

What happens now that the fish are listed?

Q7: What is the next step, now that the salmon in the eight rivers are listed?

The listing will have three major effects.

* First, the ESA requires that a recovery plan be developed to restore a species to health. The Services are committed to a full partnership with the State of Maine in developing and implementing the recovery plan. It is expected that the State's Conservation Plan will serve as the basis for the ESA recovery plan. The public will have ample opportunity to comment on a draft recovery plan before it becomes final.

While the plan is being developed, the Services will continue working with the State and other interested parties, as they have for more than 50 years, on recovery activities – especially on collaborative projects to stock salmon in their natal streams and to monitor the development and return of adult salmon to spawn.

* Second, the ESA requires all federal agencies to consult with the Services to ensure that any action authorized, funded, or carried out by any federal agency is not likely to jeopardize the continued existence of the listed salmon.

* And third, 30 days after the listing it will be a federal violation to “take” DPS Atlantic salmon. “Take” means “to harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect.”

Q8: Will there be any catch-and-release fishing allowed for Atlantic salmon now that the fish are listed?

Yes, but not in the DPS rivers. Salmon fishing in DPS rivers was already prohibited by the State (since December 1999). There is a fishery for landlocked (freshwater) salmon in some Maine rivers and lakes. Fishing for non-listed sea-run salmon is permitted in the Merrimack River in New Hampshire.

Q9: Will Native Americans be allowed to catch Atlantic salmon?

The Services are responsible for working with federally recognized tribes to accommodate ceremonial and traditional subsistence uses of species protected by the ESA. A tribe would consult with the Services to establish provisions for take if there was such a use. Beyond this, Native Americans have the same responsibilities as all Americans to protect endangered species.

Q10: Will we still be able to buy Atlantic salmon in the store?

Yes. Atlantic salmon in your grocery store is an aquaculture product of U.S. and foreign production and is not subject to ESA protection, which only applies to the distinct population

segment of salmon in the Gulf of Maine.

Q11: What is the penalty if an individual harms, catches or kills an Atlantic salmon?

The ESA prohibits the “take” of any threatened or endangered species or its habitat; take means “to harm, harass, pursue, hunt, shoot, wound, kill, trap, capture, or collect.”

If an individual or organization plans an activity that may accidentally take an Atlantic salmon, and no federal funds or permits are required for the project, they should apply for an incidental take permit. This permit provides legal protection in case a listed species is taken despite best efforts. There may be mitigation and a conservation plan required for the incidental take.

If an individual illegally takes a species protected by the ESA, the penalties can be as high as a \$100,000 fine, up to a year in prison, and forfeiture of items such as boats and nets used in the crime. Penalties are higher for organizations.

Q12: Commercial aquaculture companies are raising fish from the DPS rivers to assist conservation efforts – what happens if one of these fish dies in an aquaculture pen?

The Services, three aquaculture companies, the Maine Atlantic Salmon Commission, the St. Croix International Waterway Commission and the University of Maine are involved in a project to raise Atlantic salmon to adulthood in marine aquaculture pens as part of a river-specific stocking program. Permits for endangered species recovery activities such as this will be issued by the Services. As with other recovery efforts, some mortality is expected and would be covered by these permits.

What is being done to save Atlantic salmon?

Q13: Now that salmon fishing is prohibited and stocking programs are in full swing, why are the DPS Atlantic salmon still in danger of extinction?

A number of factors helped to cause the decline of Atlantic salmon. Salmon were once abundant in 34 Maine rivers and 11 major watersheds outside Maine. These runs all had been depleted by the early 1800s due to overfishing, water quality degradation, and the damming of rivers. Current threats to the remaining wild populations (the DPS salmon) include habitat destruction or modification (including water withdrawal from rivers), predation, disease, and the potential for interaction with aquaculture escapees. Although fishing for DPS Atlantic salmon is no longer allowed in the United States, subsistence fisheries in Greenland and a few other places pose a reduced but continuing threat.

Q14: Which are the most serious threats?

The populations in the DPS rivers are at such low levels that any threat can become a serious threat.

Disease is one of the most immediate concerns. Infectious Salmon Anemia is a serious and untreatable fish disease that was first detected in the Canadian aquaculture industry in 1996. In 1999, ISA was detected in aquaculture escapees and wild fish in Canada. The disease has moved progressively closer to U.S. waters. Today some U.S. net pen sites in Cobscook Bay are close enough to fall within ISA-positive “quarantine zones” centered in Canadian waters.

Detection of a new disease, Salmon Swimbladder Sarcoma virus, in U.S. hatcheries in 1997 led to

the destruction of Pleasant River broodstock used for river-specific stocking programs. The loss of these fish places the naturally reproducing stocks at greater risk of extinction.

Q15: What can be done to protect salmon from disease?

Disease is a threat to both farmed fish and wild fish. Protections might include a mandatory screening program to detect ISA and prohibitions against moving fish in or out of areas where ISA is a problem. Other protections might include making best management practices mandatory at aquaculture facilities (for instance, requiring measures to control sea lice, which can spread ISA). Mandatory measures to prevent the escape of fish from aquaculture facilities might also help prevent the spread of disease.

Q16: How are salmon in aquaculture pens a threat to salmon in the rivers?

The Maine aquaculture industry has grown rapidly over the last decade and now consists of 12 companies at 33 sites with approximately 750 cages and four or five freshwater hatcheries. The farmed salmon raised by these companies pose disease and genetic threats to the wild fish.

Farmed salmon are more susceptible to disease because they live in contained areas in relatively high density. For this reason, many of these fish are vaccinated, but at present effective vaccines are not available for all diseases. Diseases in farmed populations can spread when a fish escapes or when free-swimming fish migrate past the salmon farm.

Farmed salmon pose a genetic threat if they escape and reproduce with fish in the river. An elevated threat is farmed salmon raised from European populations, which have significant genetic differences from North American Atlantic

salmon. Although Maine regulations do not allow salmon breeders to use European salmon or eggs in their breeding programs, breeders are able to use sperm (“milt”) from European fish. It is estimated that European strain fish currently make up 30 to 50 percent of the fish in Maine aquaculture facilities, although recent decisions by some growers to stop using these strains may have reduced this amount.

The Atlantic Salmon Commission has documented escaped Atlantic salmon in U.S. rivers since 1993. The data are most extensive for the Dennys and Narraguagus rivers. The Dennys River is closer to more U.S. and Canadian aquaculture sites, and 116 aquaculture escapees have been documented from 1993 to the present. In the Narraguagus River for the same period, four aquaculture escapees were documented.

Q17: How will the Services deal with escaping fish from aquaculture pens if they enter the DPS rivers?

The Services and the State will continue their efforts to prevent aquaculture escapees from moving up river to spawn. Weirs are already in place on three rivers to intercept incoming adult escapees. If fish escape from sea cages they can usually be identified by their physical appearance and removed from the river. Any questionable fish can be identified through scale analysis.

Weirs, however, are not a perfect solution because they are only in the rivers part of the year. Fish that escape aquaculture facilities in the winter will likely not encounter weirs in the rivers. Thus, while the State and the Services attempt to develop strategies for containing and recovering escapees at all sites where DPS populations are identified, the most important protection is ensuring the aquaculture operations have sufficient containment to prevent escapees.

In 1999, escapes from industry freshwater hatcheries were confirmed in two DPS rivers. The industry was responsive to this development and has modified these facilities to reduce or eliminate the magnitude of escaping fish. The State and Services will continue to monitor these systems to make sure they are effective and work with the industry if escapement continues to solve this problem.

Q18: Why is water withdrawal a problem?

Water is withdrawn from DPS rivers to irrigate agricultural crops such as blueberries and cranberries. Water withdrawals are not always a problem, but depending on the time and location and volume of withdrawal they can affect the ability of the river to support salmon. Some water withdrawal proposals have suggested removing half the total river flow. Development of water management plans is proceeding for some of the DPS rivers, and this work needs to continue to ensure that the needs of the salmon are met before any water withdrawal is permitted.

Q19: What other habitat problems need to be addressed?

As far as anyone knows, there is no one habitat issue that is of overriding concern – rather the habitat problems have a cumulative effect. Some of the problems include sedimentation; obstructions such as beaver or debris dams and poorly designed road crossings; low pH in the rivers due to acid precipitation; input of nutrients; chronic exposure to insecticides, herbicides, fungicides and pesticides; elevated water temperatures from processing plants; and removal of vegetation along stream banks.

Q20: Does it do any good to spend time and money protecting habitat in Maine rivers while the salmon are facing other threats downstream and off shore?

Recovery depends on protection of all life stages throughout the geographic range of the species.

It is an open scientific question whether the biological status of the salmon stock is determined more by events in rivers, estuaries, or open oceans. Scientists have been exploring this for some time, and some recent work indicates the mortality rate may be higher in fresh water and during smolt outmigration than biologists previously thought. In addition, there are factors such as low pH and endocrine-disrupting chemicals that occur in freshwater but do not cause mortality until the fish move to the ocean.

The Services will continue to participate in cooperative research projects to help managers understand which habitat threats are the most significant.

Q21: Why is Greenland still allowing commercial Atlantic salmon fishing?

Greenland allows a limited Atlantic salmon fishery that has been scaled back considerably in recent years. The Greenland fishery takes mostly Canadian salmon and some European salmon. The probability of catching salmon from the Maine DPS rivers is small – NMFS estimates approximately 10 DPS fish per year are taken (only some of these fish would have survived to return to Maine rivers). The United States will continue to work with Greenland and other North Atlantic Salmon Conservation Organization members to ensure the quota for the West Greenland fishery is consistent with scientific advice and will not, by itself, make it impossible for the DPS population to recover.

Q22: Why is Canada still allowing commercial Atlantic salmon fishing off St. Pierre?

St. Pierre is a French island, and the salmon fishery there is not under Canadian jurisdiction. The United States has expressed concern about this fishery, but the French are not signatories to NASCO. The fishery is thought to be small and to take few DPS fish, but the details of this fishery are unknown at this time. France has been invited to attend NASCO in 2001, and the United States has begun discussing monitoring this fishery with France.

Q23: Can the Atlantic salmon population recover if we don't control seals, cormorants and other salmon predators?

There has been a significant increase in salmon predators, including seal, cormorants and striped bass. While data on predation are limited, it is thought that predation may affect recovery, especially while the number of salmon is so low. The recovery plan will address all threats to Atlantic salmon. It is important to note, however, that seals are protected under the Marine Mammal Protection Act.

The Services are committed to adaptive management solutions that let managers test methods to decrease predation and measure the effect of these actions. This could include, for instance, testing programs to keep some predators away from salmon. In the face of uncertainty, the Services believe it is better to try experimental programs to reduce predation rather than to conduct studies that merely measure the current predation.

Q24: What can individuals do to help Atlantic salmon recover?

Individuals have always been the primary eyes and ears of resource managers. All people who spend time in Maine watersheds see natural events and human activities that both harm and help salmon populations. Individuals who want to help salmon recover can report these observations and concerns to law enforcement and resource managers.

Individuals can also support strong environmental laws, learn about the environment – especially the threats to salmon – and make informed choices. Individuals who live in the DPS area can help by becoming involved in their local watershed council.

Adopting good land management practices helps salmon habitat. For example, planting trees and other vegetation near salmon streams helps prevent runoff, keeping the stream clear for spawning.

The Services have several landowner programs to encourage cooperative efforts in conserving habitat for endangered species, such as the Safe Harbor Policy, which encourages managing land to benefit listed species, and Habitat Conservation Planning, which allows land supporting endangered species to be developed if conservation measures are taken. Information can be found at <http://endangered.fws.gov>

Why not keep the salmon populations healthy through stocking programs?**Q25: Salmon have been stocked in Maine rivers for decades. Can the threat of extinction be solved by perpetual use of stocked salmon?**

Two FWS hatcheries will continue to hold brood stock from the DPS rivers and will raise and stock juvenile salmon back into these rivers. But it is important to note that hatcheries and stocking programs are tools to rebuild stocks in the river. Continuing to keep the stock alive by perpetual stocking is not an option under the law. Under the ESA, the objective of a stocking program is rebuilding the stock to the point where the stocking program is no longer needed. Recovery in the wild is the measure of success under the ESA.

The two FWS hatcheries in Maine are Craig Brook at East Orland and Green Lake at Ellsworth. The Craig Brook National Fish Hatchery holds broodstock collected from the wild populations in five DPS rivers. More than 900 surplus broodstock were released in 1998 back into the five rivers. More than 50,000 smolts from these broodstock being reared in commercial aquaculture facilities were released in the Dennys. In 2000, the hatcheries produced 965,000 fry for stocking in the DPS rivers. Additionally, eggs were transferred to aquaculture companies in 1997, who raised these salmon. In October 2000, approximately 300 adults were released into the Dennys and Machias rivers.

Q26: Is there any evidence that the stocking programs will actually help rebuild a self-sustaining population in the DPS rivers?

All the stocking programs in DPS rivers since 1991 have been river-specific programs, but the technique is new enough that results are just starting to be measurable.

One of the objectives of fry stocking is to rear as natural a fish as possible. Since fry are stocked out during the time they would normally emerge from their redds (gravel nests), their physical appearance and scale patterns are very similar to naturally spawned fish. Starting in 2000, the parents of all stocked fry were genetically screened, so scientists now have a functional genetic mark of all stocked fry. It will not be known how successful the fry stocking is until the fry return as adults in five to six years. However, work of the Atlantic Salmon Commission and NMFS suggest that stocking programs may have resulted in increased numbers of parr (4" to 6" fish) in the Narraguagus River. However, there has been only a limited response (less than 3 percent increase) of the number of smolts (6" to 8" fish) emigrating to sea.

Q27: Why did salmon held at aquaculture facilities have to be killed earlier this year?

Some pen-held salmon from the DPS rivers were destroyed on the advice of the Maine Fish Health Technical Advisory Committee. These fish were being held at facilities close to the Canadian border, within an "Infectious Salmon Anemia control area" established because fish across the border in a Canadian facility had ISA. The fish at U.S. facilities were not known to have ISA, but were destroyed as a precautionary measure to protect both remnant populations and aquaculture populations. They included approximately 2,500 salmon from the Machias, East Machias, and

Dennys rivers, and 1,000 fish from the Sheepscot River. These fish had been raised for a river-specific stocking project, which went forward because there were more than enough fish being held elsewhere to conduct river-specific stocking this year.

Q28: Why were Atlantic salmon in an FWS hatchery destroyed?

Hatchery fish are destroyed when they contract diseases that threaten the health of other fish. The decision to destroy fish is made after consultations with fish health experts and other fishery agencies and organizations.

Last year at Craig Brook National Fish Hatchery, the FWS destroyed Penobscot River returning adults as well as some fish from other rivers as a precaution to prevent the spread of salmon swimbladder sarcoma virus, which was detected in some of the returning wild fish. And, two years ago, the FWS destroyed Pleasant River broodstock at North Attleboro National Fish Hatchery in Massachusetts to prevent the spread of SSSv.

Maintaining the health of fish in hatcheries is crucial to recovering the species. The staff at Craig Brook's new facilities continue to make every effort to prevent the spread of disease, including isolating incoming fish as well as keeping fish from each DPS river in separate areas.