January 12, 2001

Mr. Stephen Silva, Manager
Maine State Program
U.S. Environmental Protection Agency - Region 1
1 Congress St., Suite 1100
Boston, Massachusetts 02114-2023

Dear Mr. Silva:

This document transmits the biological opinion of the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) on the U.S. Environmental Protection Agency's (EPA) proposed approval of the State of Maine's application to administer the National Pollutant Discharge Elimination System (NPDES) permit program, and its effects on the Atlantic salmon (*Salmo salar)*. Our biological opinion is submitted in accordance with Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*). The final notice in the Federal Register on November 17, 2000 to list the Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon as a federally-endangered species prompted EPA to request formal consultation on December 4, 2000. We received EPA's request on December 6, 2000. EPA had previously requested (on December 29, 1999) a conference with the USFWS regarding the state's permitting application when the Gulf of Maine DPS was a proposed species. The listing of the DPS as an endangered species took effect on December 18, 2000. We have, therefore, used the information gathered during the prior conference to develop this biological opinion.

This biological opinion is based on: (1) information provided in the November 1999 request from the State of Maine to administer the NPDES permit program; (2) information provided in the December 4, 2000 letter requesting formal consultation and modifying the proposed action; (3) meetings and correspondence (see Consultation History) among EPA, the USFWS and the National Marine Fisheries Service (NMFS); (4) "Final Endangered Status for a Distinct Population Segment of Anadromous Atlantic Salmon (*Salmo salar*) in the Gulf of Maine" (USFWS & NMFS 2000); (5) "Review of the Status of Anadromous Atlantic Salmon under the U.S. Endangered Species Act" (AASBRT 1999); (6) field investigations; and (7) other sources of information. A complete administrative record of this consultation is on file in the USFWS's Maine Field Office located in Old Town, Maine.

CONFERENCE AND CONSULTATION HISTORY

March 4, 1999 - Meeting at the USFWS office in Concord, NH to discuss the State of Maine's proposed NPDES permit program. Participants included: G. Russell, USFWS; K. Tripp, USFWS; M. Bartlett, USFWS; M. Amaral, USFWS; K. Carr, USFWS; S. Silva, EPA; D. Cochrane, EPA.

July 8, 1999 - Draft letter from S. Silva, EPA, to M. Bartlett, USFWS, informing the USFWS that EPA will propose approving the Maine NPDES program.

November 16, 1999 - Briefing on the status of the proposed listing of the Atlantic salmon provided to EPA and U. S. Army Corps of Engineers (USACE) staff as part of the Mid-Level Managers' meeting at the office of the NMFS in Gloucester, MA. Participants included: W. Mahaney, USFWS; G. Russell, USFWS; M. Bartlett, USFWS; R. Pisapia, USFWS; Dan Kimball, USFWS; C. Mantzaris, NMFS; M. Colligan, NMFS; P. Colosi, NMFS; Jack Terrill, NMFS; S. Silva, EPA; R. Manfredonia, EPA; S. Mahaney, USACE; J. Clement, USACE; D. Killoy, USACE; C. Godfrey, USACE; B. Lawless, USACE.

December 29, 1999 - Letter from S. Silva, EPA, to M. Bartlett, USFWS, requesting a conference with the USFWS regarding the effects on Atlantic salmon of EPA's potential approval of the Maine NPDES permit program.

December 30, 1999 - Federal Register notice by EPA of the State of Maine's application to administer the NPDES permit program. Public comments are accepted through February 29, 2000, with EPA's decision on the application due by March 16, 2000.

January 7, 2000 - G. Russell, USFWS (Maine Field Office) receives copy of the State of Maine's application to administer the NPDES permit program.

February 7, 2000 - Meeting at NMFS office in Gloucester, MA to discuss the proposed approval of the NPDES permit program and implications for Atlantic salmon related to marine aquaculture facilities and freshwater hatcheries. Participants included: W. Mahaney, USFWS; G. Russell, USFWS; M. Bartlett, USFWS; R. Pisapia, USFWS; Dan Kimball, USFWS; C. Mantzaris, NMFS; M. Colligan, NMFS; P. Colosi, NMFS; L. Chiarella, NMFS; Kevin Collins, NOAA; Jack Terrill, NMFS; S. Silva, EPA; R. Manfredonia, EPA; Diane Gould, EPA; R. Fleming, EPA.

February 29, 2000 - Letter from P. Kurkul, NMFS, and M. Bartlett, USFWS, to S. Silva, EPA, disagreeing with EPA's conclusion that the approval of Maine's NPDES permit program is not likely to jeopardize Atlantic salmon.

March 9, 2000 - By agreement between EPA and the State of Maine, the 90-day review period for EPA to consider the State's application is extended by 60 days until May 16, 2000.

March 14, 2000 - Letter from S. Silva, EPA, to M. Bartlett, USFWS, requesting conclusion of consultation on the approval of the Maine NPDES permit program and recognizing that conferencing on Atlantic salmon is still in progress.

April 13, 2000 - Letter from M. Bartlett, USFWS, to S. Silva, EPA, indicating that the approval will not have an effect on any federally-listed species other than bald eagles.

April 17, 2000 - Meeting at EPA's office in Boston, MA to further discuss the State of Maine's application to administer the NPDES permit program. Participants included: W. Mahaney, USFWS; M. Bartlett, USFWS; Ralph Pisapia, USFWS; Kim Tripp, USFWS; J. Naiman, DOI; Pete Colosi, NMFS; C. Mantzaris, NMFS; M. Colligan, NMFS; L. Chiarella, NMFS; S. Silva, EPA; Ann Williams, EPA; R. Fleming, EPA; J. Fowley, EPA.

May 9, 2000 - Email from M. Bartlett, USFWS, to S. Silva, EPA, transmitting the draft conference opinion.

May 17, 2000 - By agreement between EPA and the State of Maine, EPA is given a 30-day extension until June 15, 2000 to make a decision on the State's application.

May 30, 2000 - S. Silva, EPA, emails M. Bartlett, USFWS, to discuss changes to EPA's proposed action in response to the draft conference opinion.

June 2, 2000 - Conference call to discuss EPA's approval decision on Maine's application. Participants included: W. Mahaney, USFWS; M. Bartlett, USFWS; Kim Tripp, USFWS; Bob Pine, USFWS; J. Naiman, DOI; Holly Wheeler, DOI; S. Silva, EPA; Rob Wood, EPA; R. Fleming, EPA; M. Colligan, NMFS; K. Collins, NOAA.

June 12, 2000 - FAX from Roger Fleming, EPA, to Holly Wheeler, DOI, providing EPA comments on the draft conference opinion.

June 13, 2000 - Conference call to further discuss EPA's approval decision on Maine's application. Participants included: M. Bartlett, USFWS; K. Tripp, USFWS; G. Smith, USFWS; P. Nickerson, USFWS; H. Wheeler, DOI; Joris Naiman, DOI; Chris Mantzaris, NMFS; Kevin Collins; NOAA; Tod Siegal, EPA; Carl Doerker, EPA; Robert Dreher, EPA; Pam Hill, EPA; Roger Fleming, EPA.

June 28, 2000 - EPA announces in the Federal Register that the public comment period is reopened until July 28, 2000 on the question of whether EPA should approve the State's application to administer the NPDES program in the lands or territories of the Indian Tribes in Maine.

July 31, 2000 - EPA and the State of Maine agree to a 60-day extension until September 26, 2000 for EPA to make a decision on the State's application.

November 17, 2000 - Federal Register notice by the USFWS and NMFS listing the Gulf of Maine Distinct Population Segment of Atlantic salmon as an endangered species.

December 4, 2000 - Letter from M. Lubber, EPA, to M. Parker, USFWS, and P. Kurkul, NMFS, requesting consultation and providing modifications to EPA's proposed action.

December 7, 2000 - E-mail from S. Silva, EPA, to W. Mahaney, USFWS, describing the NPDES permit review process.

December 28, 2000 - Letter from M. Bartlett, USFWS, to S. Silva, EPA, acknowledging receipt of EPA's Dec. 4, 2000 request for initiation of formal consultation.

January 5, 2001 - Email from M. Bartlett, USFWS, to S. Silva, EPA, transmitting the draft biological opinion.

January 10, 2001 - Email from S. Silva, EPA, to M. Bartlett, USFWS, transmitting EPA's comments on the draft biological opinion.

BIOLOGICAL OPINION

I. DESCRIPTION OF THE PROPOSED ACTION

The proposed action is EPA's approval of the application by the State of Maine to administer the NPDES permit program, pursuant to Section 402 of the Clean Water Act (CWA). If EPA approves the NPDES permit program, the state will regulate the discharge of pollutants from point sources into navigable waters, subject to continuing EPA oversight and enforcement authority, in place of the NPDES program now administered by EPA in Maine.

If the Maine program is approved, EPA and the State of Maine will enter into a Memorandum of Agreement (MOA) specifying respective responsibilities in program implementation, including enforcement (64 FR 73552, December 30, 1999). Included in the draft MOA is a commitment that by November 2001, the Maine DEP will issue draft permits (or draft general permits or draft permit denials, if appropriate) for all marine aquaculture facilities and freshwater hatcheries engaged in the rearing of Atlantic salmon. Final permits (or denials, as appropriate) would be issued within six months thereafter. EPA has also proposed to enter into an MOA with the USFWS and NMFS to enhance coordination for those NPDES permits which might affect species or critical habitat listed under the federal Endangered Species Act (ESA).

By letter dated October 13, 1999, Governor Angus King requested NPDES program approval from EPA and, as required by 40 CFR 123.21, submitted a program description (including funding, personnel requirements and organization, and enforcement procedures), an Attorney General's statement, copies of applicable state statutes and regulations, and an MOA to be executed by the

Regional Administrator of EPA Region 1 and the Commissioner of the Maine Department of Environmental Protection (DEP). EPA received this package of materials on November 18, 1999. By letter dated December 15, 1999, Maine submitted a supplement to its application package, providing an update to Maine's Continuing Planning Process. This supplement was received by EPA on December 17, 1999 and made the application complete as of December 17, 1999. EPA was expected to make a decision on Maine's application within 90 days (i.e., March 16, 2000). However, on March 9, 2000, the State of Maine and EPA agreed to a 60-day extension, establishing May 16, 2000 as the new deadline for approving the program. The State of Maine and EPA subsequently extended the May 16, 2000 deadline until June 15, 2000. On June 28, 2000, EPA reopened the public comment period until July 28, 2000 to receive comments only on the question of whether EPA should approve the State's NPDES program in the lands or territories of the Indian Tribes in Maine. At approximately the same time (July 31, 2000), EPA and the State of Maine agreed to another extension for EPA's decision until September 26, 2000. When EPA had not reached a final decision by September 26, 2000, their ability to issue NPDES permits in the state of Maine was suspended.
Under the NPDES permit program, the State of Maine would be responsible for issuing permits for various point source discharges, including those from marine aquaculture facilities and freshwater hatcheries (concentrated aquatic animal production facilities, as defined in 40 CFR §122.24). Both fall under the purview of the NPDES program. NPDES permits place limits on the amount of pollutants that may be discharged, and impose other conditions such as monitoring and best management practices in order to protect water quality. EPA retains oversight authority over NPDES permits issued by Maine, including the authority to object to a permit where, among other reasons, EPA finds that the permit does not ensure compliance with EPA regulations or with applicable water quality standards under the Act. See, e.g., 40 CFR § 123.44(c)(1) and (8). EPA regulations require that state water quality standards establish designated uses for its waters consistent with the goals of the CWA, and provide for the maintenance and protection of both designated and existing uses and the water quality necessary to protect those uses (40 CFR §§ 131.10, 131.12). Maine's water quality standards currently contain such requirements, and EPA retains the authority under Section 303(c) of the CWA to ensure that Maine's water quality standards will continue to require the protection of designated and existing uses.

EPA has concluded that the presence and continued propagation of wild Atlantic salmon is an existing instream use of the DPS rivers and EPA has adequate authority under the CWA to object to a proposed state permit that fails to include conditions necessary to avoid adverse impact to the DPS where such adverse impact causes or contributes to the failure of a water body to meet state water quality standards. See Letter from Mindy S. Lubber, Regional Administrator, EPA-New England to Dr. Mamie A. Parker, Acting Regional Director, U.S. Fish and Wildlife Service, and Patricia A. Kurkul, Regional Administrator, Northeast Region, National Marine Fisheries Service (December 4, 2000). EPA has analyzed current information, including the information contained in the USFWS's and NMFS's listing documents and considers that the impacts to the wild salmon described therein would be inconsistent with Maine's water quality standards.

The Maine Atlantic salmon marine aquaculture industry is currently composed of 12 companies, which operate at 33 sites with a total of 773 marine cages covering 800 acres of water (65 FR 69477, November 17, 2000). Each year the industry puts more than 4 million Atlantic salmon smolts in marine cages in Maine waters. Fish grow in marine cages approximately 18 months before being harvested, yielding an average standing crop of about six million salmon in two-year classes (Baum 1998). Marine aquaculture facilities are concentrated in Cobscook Bay near Eastport, Maine but also occur elsewhere along the coast, including Machias Bay and as far south as the Sheepscot River (although this site does not currently grow Atlantic salmon). Five freshwater hatcheries in Maine currently grow salmon for use in marine cages. The hatcheries are located in the towns of Oquossoc, Bingham, Solon, Deblois, and East Machias. Two of these hatcheries, in the towns of Deblois and East Machias, are located on rivers included in the DPS.

Although marine aquaculture facilities are clearly regulated under the NPDES permit program, EPA has never issued any such permits for aquaculture projects in Maine. On September 25, 2000, the EPA wrote a draft NPDES permit for Acadia Aquaculture to discharge from a proposed marine finfish farm in Blue Hill, Maine. EPA has issued NPDES permits for freshwater hatcheries that raise fish for use in marine cages; however, these permits do not prohibit the escape of fish. The State of Maine currently regulates marine aquaculture facilities through a lease program under the jurisdiction of the Maine Department of Marine Resources (DMR). As a condition of obtaining a lease from DMR, DEP must certify that the aquaculture project will not have a significant adverse effect on water quality or violate the standards assigned to the receiving water's classification (MRSA, TITLE 38, Chapter 3, §413, 2-F. Exemption; aquaculture).[1]

Upon approval of the Maine program, EPA and the State of Maine will enter into an MOA specifying respective responsibilities in program implementation, including enforcement (64 Fed. Reg. 73552, December 30, 1999). Section IV.E. of the MOA and 40 CFR Parts 122-123, together with specific commitments made by the EPA in their December 4, 2000 letter to the USFWS and NMFS, provide procedures governing permit review and issuance by the State of Maine that enable EPA and the USFWS and NMFS to closely coordinate their review of the terms of each proposed permit for an Atlantic salmon aquaculture or hatchery facility, as follows:

1. Under § IV.E. of the MOA, between EPA and the State of Maine, the DEP will provide copies of public notices of permit applications to the USFWS and NMFS as such applications are received. This will provide the USFWS and NMFS with early notification that an application has been received by DEP. The USFWS and NMFS may express any interests, comments and concerns to

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[1] DEP has attested in its CWA Section 401certifications that current marine aquaculture practices do not violate the Maine Water Quality Standards.

DEP and EPA at this point, even before work on the draft permit has begun.

2. DEP is obligated under existing CWA regulatory authority requirements and the MOA to provide notice and copies of draft permits to the USFWS and NMFS. See 40 CFR 124.10(c)(1)(iv); 40 CFR 124.10(e); § IV.E. of the MOA. Under § IV.E., DEP must provide each person who receives a copy of the draft permit, including the USFWS and NMFS, with thirty (30) days within which to submit comments on the draft permit and/or request a public hearing. The comment period for draft general permits is ninety (90) days.

3. Under § IV.C. of the MOA and 40 CFR 123.44, the comment period shall be extended to ninety (90) days upon request of EPA. During the comment period, or during any extension of such comment period, EPA and the USFWS and NMFS will work with DEP to share information on draft permits that may raise issues regarding impacts to federally-listed species and critical habitat, including the Atlantic salmon. Copies of any comments from the USFWS and NMFS to the DEP will be sent to EPA. Furthermore, the USFWS and NMFS will advise EPA by telephone of serious issues that could cause adverse impacts to the Atlantic salmon so that EPA can request additional time to review the permit or submit an interim objection until the matter can be resolved.

Specifically, EPA has committed to the USFWS and NMFS that if the information provided pursuant to 40 CFR 123.43 is inadequate to determine whether the conditions in the proposed permit adequately protect the Atlantic salmon so as to avoid a violation of state water quality standards, EPA will utilize its authority, including its authority under 40 CFR 123.44 to file an interim objection, to gather sufficient information upon which to base a determination. See Letter from Mindy S. Lubber at 2 footnote 1. EPA anticipates that the USFWS and NMFS, as the entities with relevant biological expertise relating to protection and restoration of Atlantic salmon, will provide the State and EPA any concerns they may have regarding the adequacy of draft permit conditions, as well as any recommendations for appropriate alternative protective measures. In keeping with its CWA responsibilities, EPA will then determine – taking into account the USFWS's and NMFS's expert opinion on the effect of the proposed activity – the permit's consistency with the guidelines and requirements of the CWA. See Letter from Mindy S. Lubber at 3.

4. EPA will object to any permit proposed by the DEP authorizing activities that would adversely affect Atlantic salmon where such adverse effects would cause or contribute to a failure of a water body to meet state water quality standards, unless such adverse effects are avoided by incorporating permit conditions that protect Atlantic salmon. See Letter from Mindy S. Lubber at 2-3. These permit conditions may be those recommended by the USFWS or NMFS or other permit conditions that the EPA determines are equally protective of salmon. EPA has stated its view that proposed permits authorizing activities that would adversely affect Atlantic salmon, through, among other things, the escape of farmed and non-North American strains of salmon which may interbreed with the wild Maine strains, compete for habitat, disrupt native salmon redds, and spread disease, would be inconsistent with Maine's water quality standards and objectionable under the CWA. See Letter from Mindy S. Lubber at 3-4.

EPA's December 4, 2000 letter also commits EPA to object to any permit that does not include the following conditions, recommended by the USFWS and NMFS, or other equally-protective conditions designed to minimize adverse effects on Atlantic salmon from either marine aquaculture or freshwater hatchery facilities:

For marine aquaculture facilities:

a. Use of transgenic salmonids is prohibited.

b. The use of reproductively viable non-North American Atlantic salmon stocks is prohibited for new facilities or expansions of existing facilities. Permits for existing facilities located within 10 km of the mouth (as determined by National Wetland Inventory data) of a river containing a wild Atlantic salmon population will require phasing out of the use of reproductively-viable non-North American salmon stocks by September 1, 2001; any future permits for such facilities will prohibit use of such stocks. Permits for all other existing facilities will require phasing out of the use of reproductively viable non-North American stocks by January 1, 2002, after which date permits for such facilities will prohibit use of such stocks.[2]

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[2] The USFWS/NMFS have found that negative consequences to native Atlantic salmon from interbreeding with escaped commercially-cultured Atlantic salmon are increased if the commercially-cultured fish is of non-North American strain. From a biological standpoint, the most risk averse approach would be to eliminate the use of reproductively viable non-North American strain Atlantic salmon from the commercial industry immediately. However, North American strain Atlantic salmon are not available at all the appropriate life stages to allow immediate substitution of these stocks for the pure and hybrid non-North American strains currently held by the industry in freshwater rearing facilities and marine cages. Therefore, a requirement for an immediate substitution would result in a loss of production for the industry and would not be practically or economically feasible. The conditions proposed by the USFWS and the NMFS attempt to provide a timely phase out of the non-North American strains, while enabling the industry to make the necessary switch in their hatchery production to North American stocks, thus minimizing impact on future production programs. Based on our calculations, approximately 44% of the

c. An integrated loss control plan must be in place, which includes a schedule for preventive maintenance and inspection of the marine containment system and addresses methods for predator deterrence, site husbandry practices, contingency escape recovery protocols, loss reporting requirements, and storm preparedness measures.

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marine aquaculture facilities are located within 10 km of the mouth of a river (measured according to NWI) containing a naturally-reproducing salmon population. The likelihood that an escaped commercially-cultured fish will enter a river is directly related to the distance from the point it escapes to the river. By phasing out the use of reproductively viable non-North American Atlantic salmon stocks from cages located closer to rivers containing naturally-reproducing salmon populations (i.e., within 10 km of a river mouth) first, the probability that an escaped commercially-cultured salmon in a river within the DPS will be of European origin is reduced.

d. The facility will be designed or modified to achieve zero escaped salmon in any Maine river.[3]

e. Each Atlantic salmon juvenile placed into a pen will carry a mark registered either with the EPA or the Maine Atlantic Salmon Commission that will identify it with a specific site. Marks used must be permanent, and if internal tags are used, the presence of the tag must be externally detectable (visually or by means of a mechanical or electronic device).

For freshwater hatchery facilities:

Permits issued to freshwater hatcheries raising salmon will require that the facility be designed or modified to achieve zero escapement of fish from the facility.

5. In all cases where EPA finds (taking into account all available information, including any views provided by the USFWS and NMFS during their review of draft permit conditions described above) that the proposed permits would authorize activities that would result in adverse effects that are likely to jeopardize the continued existence of Atlantic salmon, EPA will object to the permit as such jeopardy would necessarily constitute a violation of Maine water quality standards. See Letter from Mindy S. Lubber at 4.

6. If EPA objects to a NPDES permit, EPA will follow the permit objection procedures outlined in 40 CFR 123.44 and coordinate with the USFWS and NMFS in seeking to have the State revise its permit. Maine DEP may not issue a permit over an outstanding EPA objection. Where the objection is not resolved such that jeopardy is avoided, EPA will assume permitting authority for the subject facility. If EPA assumes permit issuing authority for a NPDES permit, EPA will consult with the USFWS and NMFS prior to issuance of the permit (as a federal action) under Section 7 of the ESA. Any permit issued by EPA will, following consultation under Section 7 of the ESA, include conditions necessary to protect the DPS. See Letter from Mindy S. Lubber at 4.

7. In the unlikely event that, despite all best efforts, the USFWS, NMFS, and EPA cannot agree on whether proposed permits adequately protect Atlantic salmon so as to avoid violations of water

[3]The detection of escapees in any river will also trigger a response to eliminate or minimize any lasting impact of that escape event on wild Atlantic salmon. Immediate actions that could be undertaken by the aquaculture industry, state, or other appropriate parties could include attempts to recapture the escapees at the marine aquaculture facility or tending weirs within the rivers.

quality standards, the agencies intend to utilize the interagency elevation procedures set forth in a draft MOA among EPA, the USFWS, and NMFS in order to achieve a prompt resolution prior to EPA's determination regarding adequacy of the permit under the CWA. See "Draft Memorandum of Agreement Between the [EPA, USFWS, and NMFS] Regarding Enhanced Coordination Under the Clean Water Act and the Endangered Species Act," 64 Fed. Reg. 2742 - 2757, 2748 (January 15,

1999).[4] EPA has the right to delay permit issuance at least 90 days from receipt of a draft permit [40 CFR 123.44(a)(1)] to allow completion of this process.

8. If EPA and the USFWS/NMFS are unable to achieve agreement on permit conditions that adequately protect the DPS using the elevation procedures set forth in the draft MOA, EPA agrees to *reinitiate* consultation on the approval of Maine's NPDES program. During consultation, EPA will evaluate whether to initiate proceedings to withdraw program authorization to the state, or to take other corrective actions consistent with its CWA authorities.

9. Lastly, EPA agrees to reinitiate consultation "if circumstances warrant" such as if new information reveals effects to wild Atlantic salmon not considered in this opinion. In the event such consultation develops relevant information suggesting serious adverse effects on the DPS, EPA will consider such information in deciding whether to initiate proceedings to withdraw program authorization under Section 402(c) of the CWA or to take other appropriate action under its CWA authorities.

II. STATUS OF THE SPECIES

A. Species Description

The Atlantic salmon is an anadromous fish species. Coloration varies from silver, while at sea, to a dark brown or bronze after they enter fresh water to reach their spawning grounds. The Atlantic salmon is native to the basin of the North Atlantic Ocean, from the Arctic Circle to Portugal in the eastern Atlantic, from Iceland and southern Greenland, and from the Ungava region of northern Quebec south to the Connecticut River (Scott and Crossman 1973).

The ESA considers the term "species" to include "any subspecies of fish or wildlife or plants, and any distinct population segment (DPS) of any species of vertebrate fish or wildlife that interbreeds when mature." One of the purposes of this definition is to conserve genetic diversity. Species sub-structure is particularly important to anadromous salmonines because their strong homing capability fosters the formation of discrete populations exhibiting important adaptations to local riverine ecosystems and the watersheds that determine their character (Berst and Simon 1981; Utter 1981;

[4]Although the MOA itself has not been signed, the agencies stated in the preamble at 2744 that the elevation procedures are intended to be followed on an interim basis until the MOA is finalized.

Utter *et al*. 1993; Nielsen 1998).

A DPS of anadromous Atlantic salmon in the Gulf of Maine was listed as an endangered species on November 17, 2000 (65 Fed. Reg. 69459). The DPS encompasses all naturally reproducing remnant populations of Atlantic salmon north of and including tributaries of the lower Kennebec River to the mouth of the St. Croix River. The watershed structure, available Atlantic salmon habitat, and abundance of Atlantic salmon at various life stages are best known for the following eight rivers: the Dennys River, East Machias River, Machias River, Pleasant River, Narraguagus River, Ducktrap River, Sheepscot River, and Cove Brook (64 FR 62627, November 17, 1999).

Listing History

In response to a petition submitted in 1993 to list Atlantic salmon under the ESA, the USFWS/NMFS completed a review of the species status in 1995. The USFWS/NMFS concluded that the species was in danger of extinction and published a proposed rule to list the DPS of Atlantic salmon as threatened. In that proposed rule, the State of Maine was invited to prepare a plan to eliminate, minimize and mitigate threats to Atlantic salmon and their habitat. On December 17, 1997, the USFWS/NMFS withdrew the proposed rule designating the Atlantic salmon DPS as threatened. The withdrawal was based on an evaluation of the information then known about the biological status of the species and consideration of actions ongoing by international, state, federal, and private entities, including the State of Maine's Atlantic Salmon Conservation Plan (Conservation Plan).

In January 1999, the USFWS/NMFS received the State of Maine 1998 Annual Progress Report on implementation of the Conservation Plan. After review of the Annual Report, public comments, and a 1999 revised Atlantic salmon status report, the USFWS/NMFS determined that the species' status had deteriorated since the December 1997 determination that listing was not warranted and that major threats remained unresolved. In addition, a new threat, the Infectious Salmon Anemia (ISA) virus, had emerged. On November 17, 1999, the USFWS/NMFS again proposed to list the Atlantic salmon DPS, this time as an endangered species. After review of public comments and consideration of new information and data, the USFWS/NMFS published a final rule on November 17, 2000 listing the Atlantic salmon DPS as an endangered species.

B. Life History

1. Riverine Habitat

Adult Atlantic salmon ascend the rivers of New England beginning in the spring, continuing into the fall, with the peak occurring in June. Once an adult salmon enters a river, rising river temperatures and water flows stimulate upstream migration. When a salmon returns to its home river after two years at sea (referred to as 2-sea-winter or 2SW fish), it is approximately 75 cm long and weighs approximately 4.5 kg. A minority (10-20%) of Maine salmon return as smaller fish, or grilse, after only one winter at sea (1SW) and still fewer as larger 3-sea-winter (3SW) fish. A spawning run of salmon with representation of several age groups ensures some level of genetic exchange between generations. Once in freshwater, adult salmon cease to feed during their up-river migration. Spawning occurs in late October through November.

Approximately 20% of Maine Atlantic salmon return to the sea immediately after spawning, but the majority overwinter in the river until the following spring before leaving (Baum 1997). Upon returning to salt water, the spawned salmon or “kelt” resumes feeding. If the salmon survives another 1-2 years at sea, it will return to its home river as a “repeat spawner.”

The salmon’s preferred spawning habitat is a gravel substrate with adequate water circulation to keep the buried eggs well oxygenated (Peterson 1978). Water depth at spawning sites is typically between 30 and 61 cm, and water velocity averages 60 cm per second (Beland 1984). Spawning sites are often located at the downstream end of riffles where water percolates through the gravel or where upwellings of groundwater occur (Danie *et al*. 1984). Redds, the depression where eggs are deposited, average 2.4 m long and 1.4 m wide (Baum 1997). An average of 240 eggs are deposited per 100 m^2, or one “unit” of habitat (Baum 1997).

In late March or April, the eggs hatch into larval alevins or sac fry. Alevins remain in the redd for about six weeks and are nourished by their yolk sac. Alevins emerge from the gravel about mid-May, generally at night, and begin actively feeding. The survival rate of these fry is affected by stream gradient, overwintering temperatures and water flows, and the level of predation and competition (Bley and Moring 1988).

Within days, the fry enter the parr stage. Parr prefer areas with adequate cover, water depths ranging from approximately 10 to 60 cm, velocities between 30 and 92 cm per second, and temperature near 16E C (Beland 1984). Parr actively defend territories (Danie *et al*. 1984; Mills 1964; Kalleberg 1958; Allen 1940). Some male parr become sexually mature, and can successfully spawn with sea-run adult females. Water temperature (Elliot 1991), parr density (Randall 1982), photoperiod (Lundqvist 1980), and the level of competition and predation (Hearn 1987; Fausch 1988), as well as food supply, influence the growth rate of parr. Maine Atlantic salmon produce from five to ten parr per unit of habitat (Baum 1997). Parr feed on larvae of mayflies and stoneflies, chironomids, caddisflies and blackflies, aquatic annelids and mollusks, as well as numerous terrestrial invertebrates that fall into the river (Scott and Crossman 1973).

In a parr’s second or third spring, when it has grown to 12.5-15 cm in length, physiological, morphological and behavioral changes occur (Schaffer and Elson 1975). This process, called “smoltification,” prepares the parr for migration to the ocean and life in salt water. In Maine, the majority (80%) of parr remain in freshwater for two years while the balance remain for three years (Baum 1997). The biochemical and physiological modifications that occur during smoltification prepare the fish for the dramatic change in osmoregulatory needs that comes with the transition from a fresh water to a salt water habitat (Bley 1987; Farmer *et al*. 1977; Hoar 1976; USFWS 1989; and Ruggles 1980). As smolts migrate from the rivers between April and June, they tend to travel near the water surface, where they must contend with changes in water temperature, pH, dissolved oxygen, pollution levels, and predation. Most smolts in New England rivers enter the sea during

May and June to begin their ocean migration. It is estimated that Maine salmon rivers produce 19 fry per unit of habitat, resulting in six parr per unit and ultimately three smolts per unit (Baum 1997).

2. Marine Habitat

Atlantic salmon of U.S. origin are highly migratory, undertaking long marine migrations from the mouths of U.S. rivers into the northwest Atlantic Ocean, where they are distributed seasonally over much of the region (Reddin 1985). The marine phase starts with smoltification and subsequent migration through the estuary of the natal river. Upon completion of the physiological transition to salt water, the post-smolt stage grows rapidly and has been documented to move in small schools loosely aggregated close to the surface (Dutil and Coutu 1988). After entering into the nearshore waters of Canada, the U.S. post-smolts become part of a mixture of stocks of Atlantic salmon from various North American streams. Upon entry into the marine environment, post-smolts appear to feed opportunistically, primarily in the neuston (near the surface). Their diet includes invertebrates, amphipods, euphausiids, and fish (Hislop and Youngson 1984; Jutila and Toivonen 1985; Fraser 1987; Hislop and Shelton 1993). The diminutive Atlantic salmon post-smolts are preyed upon by cod, whiting, cormorants, ducks, terns, gulls, and many other opportunistic predators (Hvidsten and Møkkelgjerd 1987; Gunnerød *et al*. 1988; Hvidsten and Lund 1988; Montevecchi *et al*. 1988; Hislop and Shelton 1993).

Most U.S. origin salmon spend two winters in the ocean before returning to streams for spawning. Aggregations of Atlantic salmon may still occur after the first winter, but most evidence indicates that they travel individually (Reddin 1985). At this stage, Atlantic salmon primarily eat fish, feeding upon capelin, herring, and sand lance (Hansen and Pethon 1985; Reddin 1985; Hislop and Shelton 1993).

C. Population Dynamics

1. Historical Abundance

Anadromous Atlantic salmon were native to nearly every major coastal river north of the Hudson River (Atkins 1874; Kendall 1935). The annual historic Atlantic salmon adult population returning to U.S. rivers has been estimated to be between 300,000 (Stolte 1981) and 500,000 (Beland 1984). The largest historical salmon runs in New England were likely in the Connecticut, Merrimack, Androscoggin, Kennebec, and Penobscot Rivers.

By the early 1800s, Atlantic salmon runs in New England had been severely depleted due to the construction of dams, overfishing, and water pollution, all of which greatly reduced the species' distribution in the southern half of its range. Restoration efforts were initiated in the mid-1800s, but there was little success due to the presence of dams and the inefficiency of early fishways (Stolte 1981). There was a brief period in the late nineteenth century when limited runs were reestablished in the Merrimack and Connecticut Rivers by artificial propagation, but these runs were extirpated by the end of the century (USFWS 1989). By the end of the nineteenth century, three of the five largest salmon populations in New England (in the Connecticut, Merrimack, and Androscoggin Rivers) had been eliminated.

2. Current Abundance

As with most anadromous species, Atlantic salmon can exhibit temporal changes in abundance. Angler catch and trapping data from 1970 to 1998 provide the best available composite index of recent adult Atlantic salmon population trends within the DPS rivers. These indices indicate that there was a dramatic decline in the mid-1980s and that populations have remained at low levels ever since. Total documented natural (wild and stocked fry) Gulf of Maine DPS spawner returns to the rivers of the Gulf of Maine DPS range for the past six years are: 1995 (83); 1996 (74); 1997 (35); 1998 (23); 1999 (29); and 2000 (22). These counts represent minimal estimates of the wild adult returns because not all DPS rivers have trapping facilities (i.e., weirs) to document spawner returns in all years. The counts of redds conducted annually by the Maine Atlantic Salmon Commission demonstrate that salmon do return to those rivers for which no adult counts are possible. The data from these redd counts indicate that the total annual return to DPS rivers in recent years may be between 100 and 500 adults (Dan Kimball, pers. comm.).

Densities of young-of-the-year salmon (0+) and parr (1+ and 2+) generally remain low relative to potential carrying capacity. The depressed juvenile abundance is a direct result of low adult returns in recent years. Survival from the parr to the smolt stage has previously been estimated to range from 35-55% (Baum 1997). Research in the Narraguagus River, however, demonstrated at the 99% probability level that survival was less than 30% (Kocik *et al*. 1999). Survival from fry to smolt, based on results from hatchery fry planting, is reported by Bley and Moring (1988) to range from about 1-12%, and survival from egg to smolt stage is reported by Baum (1997) to be approximately 1.25%.

In short, naturally-producing Atlantic salmon populations in the Gulf of Maine DPS are at extremely low levels of abundance. This conclusion is based principally on the fact that: 1) spawner abundance is below 10% of the number required to maximize juvenile production; 2) juvenile abundance indices are lower than historical counts; and 3) smolt production is less than one-third of what would be expected based on the amount of habitat. Counts of adults and redds in all rivers continue to show a downward trend from these already low abundance levels. Given recent estimates of spawner-recruitment dynamics, some researchers suggest that adult populations may not be able to replace themselves, and that populations would be expected to decline further (Beland and Friedland 1997).

3. Conservation Hatchery Program

Atlantic salmon stocking in rivers of the Gulf of Maine DPS has historically used stocks from the Gulf of Maine DPS and neighboring river systems. The river-specific stocking program for Atlantic salmon in the Gulf of Maine DPS was initiated in 1991 by the USFWS. Currently, captive broodstock populations are held in isolation bays at the Craig Brook National Fish Hatchery in

Orland, Maine for the following rivers: Dennys, East Machias, Machias, Narraguagus, Sheepscot, and Pleasant (the Pleasant River fish are not yet sexually mature). Broodstock collections began in 1991 and initially focused on the collection of returning adults from the sea. However, due to insufficient numbers of adults, parr were collected beginning in 1992. These collections have increased the effective population size (wild and captive) and provide a buffer against extinction. The focus of the program has been to produce fry that are then stocked back into the river of parental origin. The Maine aquaculture industry is participating in the USFWS's supplementation program by raising fish derived from the broodstock. Adult fish, raised in marine cages, were stocked in the Dennys and Machias Rivers in the fall of 2000 as potential spawners. Preliminary investigation indicates that these adults did create redds in the Dennys and Machias Rivers. Continued monitoring will determine the ultimate effectiveness of river-specific adult stocking as a method to increase population numbers.

The response of Atlantic salmon populations to supplemental stocking programs can be partially evaluated based on juvenile production, but adult returns provide the best assessment of success. It will not be known until at least 2001 if fry-stocked fish will contribute substantially to the five rivers (Dennys, East Machias, Machias, Narraguagus and Sheepscot) that have been included in the stocking program to date.

D. Status

Atlantic salmon in the Gulf of Maine DPS exhibit critically low spawner abundance, poor marine survival, and are confronted with the increased presence of threats, including artificially-reduced water levels, diseases and parasites, predation, sedimentation, and genetic intrusion by commercially-raised Atlantic salmon. In the final rule listing the Gulf of Maine DPS as endangered, the USFWS/NMFS discuss the following factors affecting the DPS:

(A) Alteration to Habitat

Beland (1984) reported that the total original Atlantic salmon spawning and nursery habitat in Maine rivers was 476,577 units. Currently, there are 247,585 units of Atlantic salmon habitat in Maine that are accessible to returning adults, or 52% of the historic habitat (Baum *et al.* 1995). Impacts to Atlantic salmon habitat within the DPS watersheds are: 1) water extraction; 2) sedimentation; 3) obstructions to passage, including those caused by beaver and debris dams and poorly-designed road crossings; 4) input of nutrients; 5) chronic exposure to pesticides; 6) elevated water temperatures from processing water discharges; and 7) removal of vegetation along streambanks. The most immediate habitat threat is posed by water extraction from some rivers within the DPS range.

Water quantity and quality can be affected by the withdrawal of water for irrigation and other purposes. Adequate water flow is critical to all life stages of Atlantic salmon, including spawning, egg survival, fry emergence, juvenile survival, and smolt emigration. Water withdrawals by the commercial blueberry industry currently pose a threat to Atlantic salmon and their habitat in the Machias, Pleasant and Narraguagus Rivers. This threat, if not adequately regulated, is likely to grow in the future based on industry projections of expansion of berry production and processing. Approximately 6,000 acres of blueberries are irrigated annually. The blueberry industry plans to double its production by the year 2005 and will likely need more water for irrigation, frost protection, and berry processing.

(B) Overutilization

Both commercial and recreational harvest of Atlantic salmon historically played a role in the decline of the Gulf of Maine DPS of Atlantic salmon. From the 1960s through the early 1980s, the average exploitation rate in Maine rivers has been approximately 20% of the run (Beland 1984; Baum 1997). Because the catch and release fishery poses a threat of mortality or injury to the Gulf of Maine DPS of Atlantic salmon, it has been discontinued by the State of Maine. However, recreational fishing targeting other species also has the potential to result in incidental catch of various life stages of Atlantic salmon that could result in their injury or death. Atlantic salmon parr remain vulnerable to harvest by trout anglers, and mortality associated with this activity has been documented (Maine Atlantic Salmon Task Force 1997).

(C) Disease or Predation

Fish diseases represent a natural source of mortality to Atlantic salmon in the wild, although the threats of major loss due to disease are generally associated with salmon culture. The threat from disease has remained relatively static until the last three years. Three recent events have increased our knowledge of the threat from disease to the DPS, including: 1) the appearance of ISA virus in 1996 on the North American continent; 2) the discovery in 1998 of the retrovirus Salmon Swimbladder Sarcoma virus (SSSV) within the DPS population; and 3) new information that became available in 1999 on the potential impact of coldwater disease on salmon.

Predation has always been a factor influencing salmon numbers but under conditions of a healthy population would not be expected to threaten the continued existence of that population. The threat of predation on the Gulf of Maine DPS is significant today because of the very low numbers of adults returning to spawn and the dramatic increases in population levels of some predators such as cormorants and seals. There is insufficient data at this time, however, to show that predation creates a danger of extinction to the DPS.

(D) Inadequacy of Existing Regulatory Mechanisms

Major threats to salmon continue to be poor marine survival, water withdrawals, disease, and aquaculture impacts, especially interaction with European strain and hybrid salmon (64 CFR 69477, November 17, 2000). A variety of state and federal statutes and regulations seek to address threats to Atlantic salmon and their habitat. These laws are complemented by international actions under the North Atlantic Salmon Conservation Organization (NASCO), many interagency agreements, and state-federal cooperative efforts. Existing regulatory mechanisms either lack the capacity or have not been implemented adequately to decrease or remove threats to wild Atlantic salmon.

(1) Water withdrawals

Water withdrawals for irrigation and other purposes are, to some degree, regulated by the State of

Maine and the USACE. Where permits are required, the state and the USACE can include minimum flow requirements to protect salmon and their habitat. The state, however, has yet to develop comprehensive regulations and water use plans that address all needs, including those of the DPS. Until water use planning is complete, the allowable surplus above that needed for salmon has not been quantified.

(2) Disease

The European ISA virus has become established in North American aquaculture fish in proximity to Atlantic salmon in the DPS. The USFWS/NMFS believe that Maine's fish health regulations may not fully ensure testing, reporting, and depopulation of diseased fish. Furthermore, the occurrence of a heretofore unknown retrovirus, SSSV, is not yet specifically addressed by any regulations.

(3) Aquaculture

Maine State Law (PL 1991 c381 sub section 2) restricts importing fish and eggs but fails to restrict importing European milt, thus enabling expansion of the use of hybrids between European and North American salmon in aquaculture. Furthermore, USACE permit holders have continued to use European strains or hybrids despite their commitment not to do so when obtaining permits (permit applications stated that no European strains or hybrids would be placed in cages). Marine aquaculture facilities have historically operated their facilities in Maine without securing NPDES permits and EPA has not included conditions in permits issued to fish hatcheries prohibiting the discharge of fish.

(E) Other Natural or Man-made Factors

(1) Aquaculture

Atlantic salmon that escape from farms and hatcheries pose a threat to native Atlantic salmon populations in coastal Maine rivers. Escapement and resultant interactions with native stocks are expected to increase given the continued operation of fish farms and growth of the industry under current practices. There is substantial documentation that escaped farmed salmon disrupt redds of wild salmon, compete with wild fish for food and habitat, interbreed with wild salmon, transfer disease or parasites, and degrade benthic habitat (Clifford *et al*.1997; Youngson *et al*. 1993; Windsor and Hutchinson, 1990; Saunders 1991). There are also concerns over potential interactions when wild adult salmon migrate near closely spaced cages, creating potential for behavioral interactions, disease transfer or interactions with predators (DFO 1998; Crozier 1993; Skaala and Hindar 1997; Carr *et al*. 1997; Lura and Saegrov 1991).

(2) Low Marine Survival

Marine survival rates for U.S. stocks of Atlantic salmon continue to be low. Scientists attribute natural mortality in the marine environment to sources that include stress, predation, starvation, disease, parasites, and abiotic factors. Because the year-to-year variation in return rates for U.S. salmon stocks is generally synchronous with other North American stocks, marine survival appears to be, in part, due to factors in the North Atlantic, particularly the Labrador Sea.

III. ENVIRONMENTAL BASELINE

The proposed approval of Maine's application to run the NPDES program encompasses an "action area" that includes all point source discharges to navigable waters within the area of the state of Maine's jurisdiction to administer the program. The entire Gulf of Maine DPS of Atlantic salmon is included within this "action area."

As discussed in the previous section on "Current Abundance," the Gulf of Maine DPS of Atlantic salmon is in danger of extinction (65 CFR 69459, November 17, 2000). Atlantic salmon of the Gulf of Maine DPS exhibit critically low spawner abundance and poor marine survival. These two key recovery factors are further compromised by the increased presence of threats, including: artificially reduced water levels, diseases, commercial fisheries, and genetic intrusion by Atlantic salmon raised for aquaculture (see Section D., "Reasons for Listing").

IV. EFFECTS OF THE ACTION

The proposed action, the approval of the state of Maine's application to administer the NPDES permit program, will not have any **direct** effects on the Atlantic salmon or its habitat. This action will, however, have **indirect** effects on Atlantic salmon, as acknowledged by EPA in their July 8, 1999 letter to NMFS. Indirect effects are defined as those that are caused by the proposed action and are later in time but still are reasonably certain to occur (50 CFR § 402.02).

The USFWS/NMFS have determined that it is prudent to designate critical habitat for the Gulf of Maine DPS of Atlantic salmon and intend to publish a separate proposed rulemaking for that purpose. Because this proposed rule has not yet been published, this biological opinion will not discuss effects of the action on critical habitat. The following discussion, therefore, will focus on the indirect effects of the proposed NPDES permit program approval on salmon and their habitat in the Gulf of Maine DPS.

EPA's proposed approval of Maine's application to assume responsibility for permitting programs under Section 402 of the CWA is considered a federal action subject to the consultation requirements of Section 7 of the ESA. However, EPA believes it has Section 7 responsibilities for individual permits only it when it issues the permit. In view of the above, the USFWS/NMFS are concerned that individual permits could be issued that may result in adverse effects on the species that were not analyzed in this biological opinion.

In an effort to address this concern, EPA has identified the following mechanism in the project description and in their December 4, 2000 letter modifying the project description:

> 1) If the state proposes to issue a permit that is likely to jeopardize the Atlantic salmon DPS, EPA will object to the permit and assume permitting authority for the subject facility permit if resolution to avoid jeopardy is not reached. EPA acknowledges that assuming permit authority for an individual permit is consistent with its CWA authority and that issuing a federal NPDES permit is a new federal action subject to the formal consultation process

under Section 7 of the ESA.

2) If the state proposes to issue a permit that would adversely affect the DPS (below the level of jeopardy) where such adverse effects would violate state water quality standards, EPA will object to issuance of the permit.[5]

3) To avoid an EPA objection under 2 above, the state must avoid a water quality standards violation by including in any marine aquaculture or hatchery permit specific conditions recommended by the USFWS/NMFS or alternative conditions that would provide an "equivalent level of protection."

Since these alternative conditions are not identified in the December 4, 2000 letter (and therefore, possible impacts to the DPS have not yet been analyzed), the potential exists for the state, EPA and the USFWS/NMFS to disagree on the level of protection afforded Atlantic salmon under these alternative conditions.

4) In those instances where EPA and the USFWS/NMFS are unable to agree on permit conditions that adequately protect the DPS, the agencies intend to use the interagency elevation procedures set forth in the draft MOA among EPA, the USFWS and NMFS.

5) If EPA and the USFWS/NMFS are unable to achieve agreement on permit conditions that adequately protect the DPS using the elevation procedures set forth in the draft MOA, EPA agrees to *reinitiate* consultation on the approval of Maine's NPDES program. During consultation, EPA will evaluate whether to initiate proceedings to withdraw program authorization to the state, or to take other corrective actions consistent with its CWA authorities.

6) Lastly, EPA agrees to reinitiate consultation "if circumstances warrant" such as if new information reveals effects to wild Atlantic salmon not considered in this opinion. In the event such consultation develops relevant information suggesting serious adverse effects on the DPS, EPA will consider such information in deciding whether to initiate proceedings to

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[5] Given the precarious state of the DPS, the USFWS/NMFS believe that adverse effects on individual salmon would impair the viability of the entire DPS and would, therefore, constitute a violation of state water quality standards.

withdraw program authorization under Section 402(c) of the CWA or to take other appropriate action under its CWA authorities.

Even if the procedures described above are implemented as envisioned, there may still be failures of containment systems, accidents, storms, or other events that could lead to a release of aquaculture fish. Biological impacts to the DPS from such releases are discussed below.

Atlantic salmon that escape from marine aquaculture facilities or freshwater hatcheries pose a threat to native Atlantic salmon populations in coastal Maine rivers. There is a potential for escaped farmed salmon to adversely impact wild salmon by disrupting redds, competing with wild fish for food and habitat, interbreeding with native stocks, transferring disease or parasites, and degrading benthic habitat (Clifford *et al.*, 1997; Youngson *et al.* 1993; Webb *et al.* 1983; Windsor and Hutchinson 1990; Saunders 1991). Injury or death could result from these interactions.

Atlantic salmon from aquaculture-rearing facilities have been found in the St. Croix, Penobscot, Dennys, East Machias, and Narraguagus Rivers (Baum 1991; USASAC 1996, 1997). Escaped commercially-cultured salmon have also been documented in the recreational fishery and observed in the Boyden, Hobart, and Pennamaquan Rivers. The Dennys, East Machias, and Narraguagus Rivers are in the Gulf of Maine DPS range. The first documented incidence of adult commercially-cultured salmon in Maine rivers occurred in 1990 when 14 of 83 (17%) of the rod catch in the East Machias River were of marine aquaculture origin. In 1993, there were an estimated 20 marine aquaculture strays in the Dennys River. In 1994 and 1997, escaped commercially-cultured salmon represented 89% and 100%, respectively, of the documented run for the Dennys River, and in 1995 represented 22% of the documented run for the Narraguagus River. Commercially-cultured fish have also been reported by anglers in the Dennys and East Machias Rivers since 1995. In 1999, 23 (64%) of the fish captured in a trap in the St. Croix River were commercially cultured; 66 (91%) of the fish captured in the Union River were commercially cultured; and three (9%) of the fish trapped in the Narraguagus River were commercially cultured. Beginning in 1996, sexually-mature escapees have been documented annually in Maine rivers. In the St. Croix River, 17 escapees were examined in September 1998 and five (30%) exhibited evidence of sexual maturation. In 1999, all three escapees in the Narraguagus River were sexually mature (USASAC Annual Report 2000/12).

In Atlantic Canada, most aquaculture occurs in the lower Bay of Fundy, where there are an estimated 60 facilities. Although reports of large-scale escapes are rare, in 1994, between 20,000 to 40,000 fish escaped from an aquaculture facility in New Brunswick, a number that was equal to the total estimated wild return in Nova Scotia and New Brunswick. Since the aquaculture industry began in the Canadian Maritimes in 1979, escapees have been documented in 14 rivers in New Brunswick and Nova Scotia (DFO 1998). The Magaguadavic River in Canada is monitored for interactions between wild and commercially-cultured fish. In at least two years, over 90% of the adult salmon entering this river were of farm origin. These data demonstrate that three freshwater hatcheries in the watershed are discharging commercially-cultured juveniles. Smolts emigrating from the Magaguadavic River in 1996 were 51-67% commercially cultured, and those exiting the river in 1998 were 82% commercially cultured (DFO 1998). Analysis of eggs taken from this river in 1993 revealed that at least 20% of the redds were constructed by females that were commercially cultured and another 35% were of possible commercially-cultured origin (Carr *et al.* 1997).

In 1999, the outmigration of smolts on the Pleasant River was monitored using a rotary screw smolt trap deployed near the head of tide in Columbia Falls, Maine. A total of 676 smolts were captured between April 22 and May 29; approximately 5% (31) were observed with fin deformities, coloration and body form suggesting that they were from freshwater hatcheries. Scale samples and tissue samples for DNA analysis were also collected. Based on fin deformities, scale pattern analysis and genetic assignment test, it was determined that approximately 20-25% of the smolt run was of commercial hatchery origin. Following the capture of these fish, electrofishing surveys were conducted within Beaver Meadow Brook at the outflow of a commercial salmon freshwater hatchery in Deblois, Maine. Cursory electrofishing surveys documented 87 salmon parr near the vicinity of the hatchery outflow. It should be noted that the hatchery is located at the upstream end of Beaver Meadow Brook (which does not have salmon habitat) and that the nearest reach of the Pleasant River is dead water habitat (i.e., unsuitable). This information led the Maine Atlantic Salmon Technical Advisory Committee to conclude that hatchery-origin Atlantic salmon are escaping into the Pleasant River drainage from the commercial salmon freshwater hatchery in Deblois and that the escaped fish represent a threat to the remnant Atlantic salmon populations in the Pleasant River drainage (Maine TAC, March 2000).

Since 1989, annual population assessments conducted by Maine fishery scientists on Chase Mill Stream, a tributary to the East Machias River, have resulted in the capture of suspected marine aquaculture origin juvenile salmon in the vicinity of a private aquaculture hatchery discharge. These fish have been frequently noted for their deformed fins and (occasionally) for their large size, compared to wild parr. Until 1999, no attempt was made to assess the origin of these fish. In October 1999, Chase Mill Stream was specifically electrofished in the vicinity of the hatchery outlet and, based on fin condition, 28 suspected marine aquaculture origin salmon were collected (USASAC 2000/12).

Escaped commercially-cultured salmon pose a great threat in Maine, because even at low numbers they can represent a substantial portion of fish in some rivers. Also, populations at low levels, as in the Gulf of Maine DPS, are particularly vulnerable to genetic intrusion or other disturbance caused by escapees (DFO 1998; Hutchings 1991).

The threat posed by commercially-cultured salmon is increased by the fact that the industry currently uses fish that are not native to North America. The USFWS and NMFS oppose the use of reproductively-viable European strains (pure and hybrid) of Atlantic salmon within North America. This opposition is based on genetic studies that demonstrate that there are significant differences between North American and European Atlantic salmon (King *et al.* 1999), and on the fact that inbreeding among genetically-divergent populations will negatively impact natural populations (Utter *et al.* 1993; Verspoor 1997; Youngson and Verspoor 1998). The introgression by non-North American stocks presents a substantial threat to the genetic integrity of North American stocks and threatens fitness through outbreeding depression.

Commercially-cultured salmon can escape from both marine aquaculture cages and freshwater hatcheries and subsequently enter rivers within the Gulf of Maine DPS range as sexually-mature adults and precocious male parr (which are capable of spawning). Genetic data and visual observations indicate that aquaculture escapees may have successfully interbred with wild Atlantic salmon (64 FR 62635, November 17, 1999). Under current aquaculture practices (which include the use of European Atlantic salmon), the escapement of aquaculture salmon and their interactions with wild stocks are expected to persist and perhaps increase if the aquaculture industry expands in Maine. The threat of these interactions between wild and aquaculture salmon is considered particularly serious, given the fact that wild salmon stocks within the DPS range are at low abundance levels that put them in danger of extinction.

Studies have characterized the potential permanent effect of salmon escapees from cages or hatcheries on the genetic differentiation among wild stocks. Atlantic salmon populations of sizes similar to those found within the Gulf of Maine DPS are the most vulnerable to immigrations from commercially-cultured escapees. These immigration events may be one of the most significant ways in which aquaculture salmon affect the genetic structure of wild populations. While natural selection may be able to purge wild populations of maladaptive genetic traits, regularly-occurring interaction between aquaculture fish and wild salmon makes this considerably less likely. Thus, the scientific literature indicates that interactions between wild and aquaculture salmon may lead to decreased numbers of wild Atlantic salmon, and in the extreme, to extirpation of wild stock (Einum and Fleming 1997; Fleming and Einum 1997; Grant 1997; and Saegrov *et al.* 1997).

Comprehensive protective solutions to minimize the threat of interactions between wild and commercially-cultured salmon have not been implemented. In 1997 and 1998, the USFWS and NMFS worked with the aquaculture industry and state representatives in an attempt to eliminate further importation of European stocks,[6] remove pure European strain fish from marine aquaculture cages, and phase out the holding of North American/European hybrids. These discussions were unsuccessful. In July of 1999, the USFWS and NMFS initiated discussion directly with DMR. These discussions were only partially successful and did not result in any further regulation at the state level or the implementation of any protective measures by the aquaculture industry in Maine.[7]

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[6]Current Maine law restricts importation of fish and eggs but not European milt.

[7]Lawsuits recently filed by the state of Maine, the Maine Aquaculture Association, and other parties against the USFWS and NMFS allege that there is not a genetically distinct Gulf of Maine DPS that warrants protection

against genetic intrusion from aquaculture fish escapees. [(State of Maine v. Bruce Babbitt, Norman Y. Mineta, Jamie Rappaport Clark, and Penelope D. Dalton, No. 00-250-B-C, Dec. 7, 2000); and (Maine State Chamber of Commerce, Atlantic Salmon of Maine, Stolt Sea Farm Inc., Maine Aquaculture Association, Maine Pulp & Paper Association, Wild Blueberry Commission of Maine, Jasper Wyman & Sons, and Cherryfield Foods Inc. v. Bruce Babbitt, Norman Mineta, U.S. Dept.of the Interior, U.S. Dept. of Commerce, Jamie Rappaport Clark, U.S.Fish and Wildlife Service, Penelope Dalton, and National Marine Fisheries Service, No. 00-254-B-C , Dec. 12, 2000)] .

The potential use of transgenic salmonids in the aquaculture industry has recently been identified as a possible threat to wild Atlantic salmon populations. Transgenic salmonids include fish species of the genus *Salmo, Oncorhynchus*, or *Salvelinus* in the family Salmonidae that bear, within their DNA, copies of novel genetic constructs introduced through recombinant DNA technology using genetic material derived from a species different from the recipient. Transgenic salmonids pose an unknown risk of genetic and ecological effects to wild Atlantic salmon populations. Research in the use of transgenic fish for aquaculture increased through the 1980s and had advanced to the extent that, by
1989, production of 14 species of transgenic fish had been reported (Kapuscinski and Hallerman 1990). Research and development efforts on transgenic forms of Atlantic salmon and rainbow trout are currently being directed toward their potential use for sea pen aquaculture. Emphasis has been placed on enhancement of growth and low water temperature tolerance through the transfer of genetic material from other cold-tolerant species, such as flounder. Transgenic fish are new organisms, and each modification creates a new line of organism which has not developed through natural selection and evolutionary processes. Also, transgenic fish have probably undergone severe "genetic bottlenecking" in their production. Thus, it is not possible to precisely predict the impacts these fishes may have on Atlantic salmon if transgenic fish were to escape into the wild.

Transgenic fish produced for culture in marine net pens must be selected to survive under nearly natural physical and chemical environmental conditions; thus, if they escape, it is likely that a portion of them will survive. The transmission of novel genes to wild fish could lead to physiological and behavioral changes, and traits other than those targeted by the insert gene are likely to be affected (Kapuscinski and Hallerman 1990). Ecological effects are expected to be greatest where transgenic fish exhibit substantial altered performance. Such fish could destabilize or result in changes in aquatic ecosystems. Juvenile salmon of domesticated aquaculture strains have been shown to grow faster and be more aggressive than wild strains; they impact wild salmon through competition for food and space (Einum and Fleming 1997). It is reasonable to assume that genetically-modified salmonids, possessing a greatly accelerated growth potential and occupying the same habitat as wild fish, would have a greater displacement impact on wild fish than non-transgenic domestic strains.

V. CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the ESA.

Current and future local activities that may impact the Atlantic salmon DPS include: agricultural and forestry practices, mining, and sport fishing. Agricultural production within the Gulf of Maine

DPS includes the following: hay, silage, corn, livestock, Christmas trees, market vegetables, blueberries, cranberries, and horticultural plants (Maine Atlantic Salmon Task Force 1997). Water withdrawal for irrigation is the farming practice of greatest concern to the USFWS/NMFS. Other agricultural practices are not considered major threats to salmon; however, due to the low numbers of returning adult salmon, minor impacts from erosion and sedimentation, livestock waste in salmon streams, or other agricultural practices take on added significance by reducing habitat suitability.

The USFWS/NMFS do not believe that current forestry practices pose a significant threat to the well-being of the DPS. Given the precarious status of the species, however, even minor impacts to salmon or its habitat must be recognized and addressed. Consequently, the USFWS/NMFS will continue to work with the state and the private sector to improve salmon habitat and to modify any forestry practices that are clearly shown to be detrimental. Practices that cause erosion, reduced streamside shading, and debris dams should be addressed.

Continuation of activities at an existing peat mining facility in the Narraguagus River drainage may adversely affect Atlantic salmon within the Gulf of Maine DPS. Peat mining can adversely affect Atlantic salmon and their habitat through the discharge of low pH water containing suspended peat silt and dissolved metals and pesticides. There is a concern that these factors may influence juvenile salmon survival.

Although the catch and release sport fishery for Atlantic salmon has been discontinued in Maine, recreational fishing that targets other species can potentially lead to incidental catch of various life stages of Atlantic salmon, resulting in injury or death. Atlantic salmon parr can be confused with brook trout and mistakenly harvested by anglers.

Stocking of other fish species can increase the risks to salmon in the DPS through increased competition for food and through predation on juvenile salmon. Brook trout, brown trout, black bass, and landlocked salmon have all been stocked within DPS streams or headwaters; impacts on salmon are still being monitored and evaluated. The State of Maine is assessing current stocking practices to identify possible areas of conflict.

VI. CONCLUSION

After reviewing the current status of the Gulf of Maine DPS of Atlantic salmon, the procedural and biological effects of the proposed action, the regulatory requirements of EPA as the action agency under ESA, and the cumulative effects, the USFWS/NMFS have determined that the approval of Maine's NPDES program, as proposed, is not likely to jeopardize the continued existence of the Atlantic salmon Gulf of Maine DPS. We are confident that the mechanism proposed by EPA in the project description and in the December 4, 2000 letter modifying the project description provides sufficient procedural safeguards to compensate for the statutory limits on EPA's authority to consult on issuance of individual permits. Currently, no critical habitat has been designated for this species; therefore none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulation pursuant to Section 4(d) of the ESA prohibit the take of endangered or threatened species, respectively, without special exemption. The term “take” is defined to include harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the USFWS/NMFS to include an act that actually kills or injures wildlife. Such acts may include significant habitat modification or degradation that results in death or injury to a listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. The term “harass” is defined by the USFWS/NMFS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

EPA has continuing oversight responsibilities for the activity covered by this incidental take statement. The measures described below are non-discretionary. If the terms and conditions are not implemented, the protective coverage of Section 7(o)(2) does not apply. In order to monitor the impact of incidental take, EPA or the State of Maine must report the progress of the action and its impact on the species to the USFWS/NMFS as specified in the incidental take statement [50 CFR §402.14(i)(3)].

The USFWS/NMFS have developed the following incidental take statement.

A. Amount or Extent of Anticipated Take

The USFWS/NMFS have determined that incidental take may be anticipated to occur as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided, consistent with 50 CFR 402.16. EPA must immediately provide an explanation of the causes and circumstances surrounding the taking, and review with USFWS/NMFS the need for possible modification of the reasonable and prudent measures.

Commercially-cultured fish that escape from marine aquaculture facilities (net pens) or freshwater hatcheries and enter a DPS river may harm wild Atlantic salmon through disease transmission, redd superimposition, competition for food and space, and genetic introgression. It is anticipated that the presence of commercially-cultured fish in a DPS river will result in take, because it is reasonable to expect that the escapee will, at a minimum, impair essential behavioral patterns, most notably breeding. Breeding can be disrupted through interbreeding between commercially-cultured and wild salmon. The persistent intrusion of commercially-cultured fish into a native salmon population and their interbreeding with wild Atlantic salmon will result in genetic modifications to the wild population, render the wild fish less fit for survival, and could result in extirpation of the native population.

Historical accounts document commercially-farmed fish escaping from marine cages and entering Maine rivers as follows:

YEAR	St. Croix	Narraguagus	Dennys	Union	TOTAL
1994	98	1	42		141
1995	13		4		17
1996	20	8	21		49
1997	27		2		29
1998	25				25
1999	23	3		63	89
2000	30		29	3	62

These historical data, however, are not a reliable indicator of the full extent of marine aquaculture escapees intruding into the DPS rivers because 1) there is a lack of counting or interception facilities on several DPS rivers, and 2) escapees are not currently marked (aquaculture escapees are currently identified by physical characteristics such as fin deformities and body shape and size). An accurate count of U.S. origin escapees is further confounded by the fact that some of the escapees detected in the DPS rivers may have come from nearby Canadian marine cages.

The difficulty of estimating the anticipated incidental take is confounded by the lack of standardized, comprehensive inventory tracking at cage sites, lack of traps/weirs on all Maine rivers, and the absence of a mark on aquaculture fish. Technology is currently a limiting factor which restricts our ability to completely track inventory at cage sites and use cage-side counting as a measure of containment effectiveness. Complete cage-side inventory tracking would provide a measure of opportunities for incidental take, as each loss from a cage could potentially end up in a river in Maine and interact with wild salmon. In the absence of a technology which would allow such complete inventory control at the cage, actual detection of escapees in a river, while an underestimate of opportunities for interaction, appears to be the only viable method by which to measure incidental take.

The impact of an escape event is affected by several factors including age, maturity and the number of fish lost, proximity to the DPS, genetic strain and fish health status. Devising an incidental take statement that incorporates all of these variables is impaired by the lack of information. Incidental take results from an interaction between the commercially-cultured escaped fish and the wild fish in the rivers. Therefore, the detection of escaped commercially-cultured fish in a river is used as a measure of the impact that existing aquaculture practices are having on the DPS.

To accommodate the complexities involved in obtaining precise and complete counts of net pen escapees entering DPS rivers, the USFWS/NMFS have chosen to express incidental take as escape episodes rather than individual escapees. An episode is defined as one or more commercially-cultured fish from a single marine aquaculture facility detected in a DPS river over a time span of seven days. Based on past escape events, seven days was chosen as a reasonable period of time that one could expect fish from a single loss event to find and enter a river. This range of time could be refined as more information is collected due to mandatory reporting of losses and improved data collection at the river. Detection of escapees in more than one river will be considered multiple episodes unless the captured fish can be traced to a single marine aquaculture site and a single loss event.

The USFWS/NMFS have reviewed past records of reported escape events and the number and location of escapees captured, as described above. Based on that information, the extent of anticipated incidental take is three escape episodes per calendar year.[8] Detection of more than three escape episodes will require reinitiation of consultation consistent with 50 CFR 402.16.

The permits issued for freshwater rearing facilities will be conditioned to prohibit the discharge of any fish, which can be accomplished with available technology. Modifications will be required to these facilities in the immediate future to comply with this permit condition. Therefore, there is no anticipated take associated with operation of freshwater rearing facilities and no take is exempted by

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[8]Frequency and magnitude of escapement from marine aquaculture facilities will decrease over time. This expectation is based on the current voluntary adoption by the aquaculture industry of a code of practice, the stated intent of the Department of Marine Resources to implement a modified code through regulatory means, and improvements in containment technology and husbandry practices. Further, the magnitude of the potential harm posed by escapees is expected to be reduced as the use of reproductively-viable non-North American strain Atlantic salmon is phased out. Review of the inventory tracking system records required in the terms and conditions, together with information obtained by tending weirs and conducting in-river surveys, will provide the USFWS/NMFS with information that can be considered in any future reinitiation.

Section 7(o)(2).

B. Reasonable and Prudent Measures

Section 7(b)(4) of the ESA requires that when an agency action is found to comply with Section 7(a)(2) of the ESA and the proposed action may incidentally take individuals of listed species, the USFWS/NMFS will issue a statement specifying the impact of any incidental taking. It also states that reasonable and prudent measures necessary to minimize impacts, and terms and conditions to implement those measures, be provided and must be followed to minimize those impacts. Only incidental taking by the federal agency or applicant that complies with the specified terms and conditions is exempted from the prohibitions of Section 9 of the ESA.

The reasonable and prudent measures and terms and conditions are required to document the incidental take and to minimize the impact of that take on the Gulf of Maine DPS of Atlantic salmon. These measures and terms and conditions are non-discretionary and must be implemented in order for the protection of Section 7(o)(2) to apply.

The USFWS/NMFS believe that the following reasonable and prudent measures are necessary and appropriate to minimize incidental take of the Gulf of Maine DPS of Atlantic salmon. EPA, Region 1 will ensure that the reasonable and prudent measures are implemented by working with the USFWS, NMFS, USACE, and the State of Maine to collect the necessary information and develop procedures for the following:

1. maintaining a database tracking inventories in hatcheries and marine cages and recording tag numbers used to mark fish;

2. reviewing the progress in reducing the escapement of farmed fish from marine cages;

3. inspecting freshwater hatcheries to evaluate the effectiveness of measures to prevent the discharge of fish from outflows;

4. reviewing progress in eliminating the escapement of farmed fish from freshwater hatcheries;

5. maintaining records of genetic testing of fish in hatcheries;

6. maintaining a list of escapees detected in Maine Rivers including a physical description of the escapee (size, sex, condition) and the tag identification; and

7. ensuring appropriate measures are taken to capture escapees, including capture efforts at marine aquaculture facilities and tending weirs or traps within rivers.

C. Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, EPA must ensure that the following terms and conditions, which implement the reasonable and prudent measures described in the previous section and outline the required reporting/monitoring requirements, are complied with. These terms and conditions are non-discretionary.

1. On an annual basis, EPA will ensure that the USFWS/NMFS receive the results of the genetic screening done on fish at freshwater hatcheries.

2. Each permit holder must maintain records of their containment systems to track cage history, the types of cages on each site, date of manufacture, date of installation, modifications and repairs, and inspections. Copies of these records will be made available to the USFWS/NMFS upon request.

3. Each permit holder must maintain an inventory tracking system that allows clear, accurate inventory tracking of all size classes of Atlantic salmon, including documentation of any escapes and documentation of escape recapture efforts. Reports must be provided to the USFWS/NMFS on an annual basis. Any escape of $500 fish must be reported to the USFWS/NMFS within 24 hours to allow implementation of protective measures in the rivers.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

EPA should evaluate the toxicity of chemicals used in aquaculture facilities and address their effects on listed species. EPA should coordinate, conduct, or support research to determine measures that could be implemented to reduce the potential for discharge of fish from freshwater and marine aquaculture facilities. Furthermore, EPA should work with the industry and other interested parties to investigate sources of fish losses and identify actions to remedy those losses.

REINITIATION NOTICE

This concludes formal consultation for EPA's proposed approval of the Maine NPDES permit program. In addition to the reinitiation procedures described in this biological opinion, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and (a) if the amount or extent of taking specified in the incidental take statement is exceeded; (b) if new information reveals effects of the action that may affect the Atlantic salmon DPS in a manner or to an extent not previously considered; (c) if the identified action is subsequently modified in a manner that causes an effect to the Atlantic salmon DPS that was not considered in the biological opinion; (d) if critical habitat for the Atlantic salmon DPS is designated that may be affected by the identified action; or (e) if a new species is listed or critical habitat designated that may be affected by the action (50 CFR §402.16). In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.
If you have any questions regarding this biological opinion, please contact Gordon Russell at 207-

827-5938 or Mary Colligan at 978-281-9116.

Sincerely yours,

Michael J. Bartlett
Supervisor
New England Field Office

Sincerely yours,

Patricia A. Kurkul
Regional Administrator
Northeast Region
National Marine Fisheries Service

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