



United States Department of the Interior



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April 26, 2023

Mr. Matt Walker, State Conservationist
Natural Resources Conservation Service
967 Illinois Avenue, Suite 3
Bangor, Maine 04401

Dear Mr. Walker:

The enclosed document contains a Tier 2 biological opinion (Opinion) prepared by the U.S. Fish and Wildlife Service (Service) pursuant to section 7(a)(2) of the Endangered Species Act (ESA) on the effects of the replacements of existing stream crossings on two separate unnamed tributaries to Middle Branch Pleasant River on the federally endangered Atlantic salmon (*Salmo salar*) and its critical habitat. Additionally, the NRCS reached a “No Effect” determination for the federally endangered northern long-eared bat, and no further consultation is required for the species.

This project, which the Natural Resources Conservation Service (NRCS) is proposing to fund, is in TB R11 WELS, Piscataquis County, Maine. The purpose of the project is to replace two road-stream crossings to improve stream habitat connectivity and aquatic organism passage and improve road safety associated with undersized culverts. The Service has determined that this project is a covered activity already evaluated by the Service in the “Proposed Funding of Eight Specific Conservation Activities throughout the State of Maine Programmatic Biological Opinion” dated November 21, 2011 (PBO). We incorporate this PBO by reference.

In the enclosed Opinion, the Service concludes that the proposed action is not likely to jeopardize the continued existence of Atlantic salmon. Furthermore, this action is not likely to result in the destruction or adverse modification of designated critical habitat for Atlantic salmon. As required by section 7 of the ESA, the Service is providing an incidental take statement with this Opinion. The incidental take statement incorporates by reference the reasonable and prudent measures found in the PBO that the Service considers necessary or appropriate to minimize incidental take associated with this action. The PBO incidental take statement sets forth nondiscretionary terms and conditions, including reporting requirements, which the Federal agency and any person involved with this project must comply with to carry

out the reasonable and prudent measures. Incidental take from activities that meet these terms and conditions will be exempt from the ESA take prohibition.

The Service appreciates your cooperation on this consultation and looks forward to continued collaboration on projects that will benefit Atlantic salmon and their aquatic habitats. The NRCS is a vital Federal agency partner in working towards the recovery of this species. Please contact Nicole Pauley by email at *Nicole_Pauley@fws.gov* or by telephone at 207/902-1585 if you have any questions regarding this consultation.

Sincerely,

Amanda S. Cross, Ph.D.
Project Leader
Maine Field Office

Enclosure

cc: Jeremy Markuson, NRCS–Bangor, Maine
Chris Reidy, NRCS–Bangor, Maine
Emily Dickison, NRCS–Bangor, Maine
Seth Jones, NRCS–Dover-Foxcroft, Maine
Peter Ruksznis, Maine Department of Marine Resources

**TIER 2 BIOLOGICAL OPINION UNDER THE NATURAL RESOURCES
CONSERVATION SERVICE FORMAL PROGRAMMATIC BIOLOGICAL
OPINION (CONSULTATION CODE: 53411-2010-F-0198)**

Lead Action

Agency: U.S. Department of Agriculture, Natural Resources Conservation Service

Activity: Pine State Timberlands LLC, Stream Crossing Replacements on Two
Unnamed Tributaries to Middle Branch Pleasant River, in TB R11
WELS, Maine and Effects to Atlantic Salmon and Critical Habitat

Consultation

Conducted By: U.S. Fish and Wildlife Service, Ecological Services Maine Field Office
(Project Code: 2023-0039844)

Approved By:

Amanda S. Cross, Project Leader

This biological opinion (Opinion) is provided in response to the Natural Resources Conservation Service's (NRCS) January 23, 2023, request to initiate formal consultation pursuant to section 7(a)(2) of the Endangered Species Act (ESA). Your biological evaluation, as submitted through a ME-ECS-1 form and supplemental materials, describes the potential effects of implementation of the Pine State Timberlands LLC stream crossing replacement projects on the federally endangered Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon (*Salmo salar*) and its designated critical habitat.

The Federal action reviewed in this Opinion is the proposed funding by the NRCS of an Environmental Quality Incentives Program project for Pine State Timberlands LLC in TB R11 WELS, Piscataquis County, Maine. With assistance from the NRCS, Pine State Timberlands LLC is proposing to replace two existing culverts on separate unnamed tributaries to Middle Branch Pleasant River on Merther Road. The undersized culverts are being replaced with pre-cast concrete abutment bridges to improve stream habitat connectivity and natural stream function while improving road safety. Middle Branch Pleasant River is a tributary of Pleasant River, a tributary of the Piscataquis River within the Penobscot Salmon Habitat Recovery Unit (SHRU).

This Opinion and incidental take statement (ITS) were prepared by the Service in accordance with section 7(b) of the ESA of 1973, as amended (16 U.S.C. 1531, *et seq.*) and implementing regulations at 50 CFR 402.

I. Background

On November 21, 2011, the Service completed a programmatic biological opinion (PBO) for the effects of eight specific activities that the NRCS may fund throughout the State of Maine on Atlantic salmon and their critical habitat. This PBO covers activities over a period of five years. Although this PBO expired on November 21, 2016, the Service and the NRCS, by mutual agreement, are in the process of renewing this programmatic section 7 consultation. In the meantime, we are continuing to process qualifying projects under the 2011 PBO.

The eight activities addressed by the PBO are the following:

- a. Stream crossing replacements
- b. Stream crossing culvert removals
- c. Stream bank and shoreline stabilization using soil bioengineering techniques
- d. Low-water crossings
- e. Large woody debris and boulder supplementation
- f. Side channel or off-channel reconnection
- g. Remnant log drive dam removals
- h. Installation/repair/replacement of existing fish passage structures

Information on the specific characteristics of each covered activity can be found in greater detail in the PBO and the NRCS's programmatic biological assessment (March 26, 2010), both of which we incorporate herein by reference. The PBO established a two-tiered consultation process for each applicable future Federal action subject to section 7(a)(2) of the ESA, with issuance of the PBO being Tier 1 and all subsequent site-specific project analyses constituting Tier 2 consultations covered by the PBO. Under this tiered consultation process, the Service produces a streamlined Tier 2 Opinion when it is determined that a proposed Federal action is "likely to adversely affect" federally endangered Atlantic salmon or designated critical habitat in the action area and the project is also an activity covered by the PBO.

Both the NRCS and the Service have determined that the Pine Stream Timberlands LLC stream crossing replacement project meets the criteria for inclusion as an activity covered by the PBO. Therefore, this Tier 2 Opinion regarding the effects of the project on Atlantic salmon and its critical habitat in the unnamed tributaries to Middle Branch Pleasant River can tier from the November 21, 2011 PBO.

II. Consultation History

The PBO contains information on the consultation history for the Tier 1 process, specific information on the status of Atlantic salmon and Atlantic salmon critical habitat throughout the GOM DPS (pages 35-48), the environmental baseline for each future Tier 2 project (page 49), and the Service's analysis of the effects of stream crossing replacement projects (pages 50-63).

The PBO concluded that, after considering the current status of Atlantic salmon and its designated critical habitat, the environmental baseline, the effects of the proposed action, and the potential for future cumulative effects in the action area, it is the Service's biological opinion that the proposed action by the NRCS – implementation of eight specific conservation activities - is not likely to jeopardize the continued existence of the GOM DPS of Atlantic salmon throughout all or a significant portion of its range. Furthermore, the proposed action is not expected to result in the destruction or adverse modification of critical habitat. In reaching these conclusions, the Service considered the best available scientific and commercial information regarding Atlantic salmon and the likely effects of the eight NRCS conservation activities on Atlantic salmon and their critical habitat.

The consultation history for the Pine State Timberlands LLC project is as follows:

- On January 23, 2023, the NRCS sent an email to the Service, along with appropriate materials, to initiate section 7 consultation for the Pine State Timberlands LLC project.
- The Service has reviewed the information submitted by the NRCS on January 23, 2023. The NRCS submittal included the ME-ECS-1 form and supplemental information, as agreed upon in the PBO.
- The Service contacted the NRCS by email to inquire about project effects to NLEB and the NRCS's effects determination for the species.

The Service concurs with your determination that the Pine State Timberlands LLC project on two unnamed tributaries to Middle Branch Pleasant River in TB R11 WELS is likely to

adversely affect Atlantic salmon, which may occur within the project action area based on the findings in your biological evaluation. The Service has also determined, based on information given in your biological evaluation, that this project is likely to adversely affect the primary constituent elements of the critical habitat present in the action area. These adverse effects are all related to short-term activities during construction of the road-stream crossing replacements.

III. Scope of the Tier 2 Biological Opinion and Applicability of the PBO

The proposed project fits the description of “*Stream Crossing Replacements*” as evaluated in the Tier 1 PBO. This project is also consistent with the “*General Prescriptions*” that apply to all activities covered by the PBO. The effects of the Pine State Timberlands LLC project, on both Atlantic salmon and its critical habitat, are also expected to be consistent with those described in the PBO. As a result, the Pine State Timberlands LLC project can be an activity covered by the PBO and then evaluated using the Tier 2 abbreviated consultation approach.

IV. Project Description (from the NRCS biological evaluation and ME-ECS-1)

The proposed project involves the replacement of two existing undersized culverts on Merther Road in TB R11 WELS, Maine. The sites, Site #62114 and Site #62115, are on separate unnamed tributaries to Middle Branch Pleasant River.

Site #62114 has an existing 3-foot diameter by 30.5-foot long corrugated metal pipe culvert. The inlet of the culvert is perched approximately 0.3 feet above the stream bottom and the outlet is perched 0.3 feet above water surface level with a scour pool below. Upstream of the culvert, there is extensive channel braiding and some subsurface flow of side channels. Based on field measurements downstream, the NRCS has determined that the average bankfull width of the unnamed tributary near this project site is 8 feet.

Site #62115 has an existing 4-foot diameter by 26-foot long corrugated metal pipe culvert. The outlet of the existing pipe is perched 0.2 feet above water surface level, with a moderate scour pool at the outlet. Downstream of the structure, the slope increases, with defined stepping pools and wood debris pool features. Based on field measurements, the NRCS has determined that the average bankfull width of the unnamed tributary near this project site is 9 feet.

Both current structures are complete barriers to aquatic organism passage and are undersized compared to the bankfull width of the unnamed tributaries in the project areas. The existing, undersized culverts will each be replaced by a 26-foot wide inside span by 30-foot long precast concrete abutment bridge. Using estimated bankfull widths the bridges inside spans will be approximately 3 times bankfull width. This will allow room for riprap placement to protect abutments and still maintain minimum 1.2 times bankfull width. Abutments will be installed outside the channel and stream banks with enough room for erosion control (e.g., straw bales, silt fence) to be placed between the abutments and the stream. NRCS expects to conduct all work from the existing road system and does not expect disturbance to channel banks and riparian zone to access the work site. Any woody debris collected from upstream of the existing crossing will be placed downstream of the crossing or will be removed from the work area altogether.

Project-specific final engineering drawings will be provided to the Service at least 30 days prior

to the start of construction, as required by the PBO.

BMPs to Minimize Adverse Effects

Several best management practices (BMPs), as outlined in the PBO, will be incorporated into the Pine State Timberlands LLC project to ensure that adverse effects to Atlantic salmon and its critical habitat are avoided and minimized as much as possible. Most of these BMPs are outlined on pages 21 through 32 of the PBO under **General Prescriptions**.

Required BMPs include (but are not limited to) the following (See the PBO for a complete list of required conservation measures.):

- A pre-construction meeting with NRCS, the program cooperator and their contractor will be held at least one week prior to construction.
- The NRCS will review and approve the sediment and erosion control plan.
- Erosion controls will be installed prior to any soil disturbing activities.
- Existing roads or travel paths will be used to access the project site and all work will be conducted with equipment operating from the existing roads and reaching into the streams as necessary.
- All instream work will be conducted from July 15 to September 30.
- Instream work will be conducted in the dry and downstream flows will be maintained during construction with negligible changes in water quality.
- Fish will be excluded and removed from the worksite before any instream work is started (with the exception of cofferdam installation and dewatering) using protocols described in the PBO (pages 25 through 29).
- All disturbed areas will be properly stabilized and revegetated within three days of the end of construction activities.

V. Status of the Species and Critical Habitat

The species description, life history, population dynamics, status, and distribution are fully described in the PBO on pages 35 through 48 for the Atlantic salmon and its critical habitat and are hereby incorporated by reference. Since issuance of the Service's PBO in November 2011, there are no substantial changes in status of Atlantic salmon or its critical habitat. Minor updates to the Status of the Species and Critical Habitat section of the PBO can be found in a more recent Programmatic Biological Opinion issued by the Service on September 26, 2017 (Service 2017). A copy of this PBO can be obtained by contacting the Service's Ecological Services Maine Field Office.

VI. Environmental Baseline

The Tier 1 PBO could not predict the exact location and action area for future projects and, therefore, could not describe the environmental baseline for any particular project. Consequently, the PBO provided several assumptions regarding the environmental baseline that should be applicable to each future NRCS project action area and allowing the Service to complete our programmatic analyses regarding both 1) jeopardy to the species and 2) destruction or adverse modification of critical habitat (page 49).

We have reviewed these PBO assumptions in relationship to the Pine State Timberlands LLC project action area (on two unnamed tributaries to Middle Branch Pleasant River) and have determined that these assumptions are applicable to this project. Below is a summary regarding the current status of Atlantic salmon and their habitat in and near the action area in the Middle Branch Pleasant River watershed in TB R11 WELS, Maine.

Both sites are located on unnamed tributaries of Middle Branch Pleasant River, which in turn is a tributary of the Pleasant River, and eventually the Piscataquis River. The confluence of the unnamed tributary at Site #62114 with the Middle Branch Pleasant River is approximately 0.8 miles downstream. The confluence of the unnamed tributary at Site #62115 with the Middle Branch Pleasant River is approximately 0.7 miles downstream. The project locations are within the range of the Atlantic salmon GOM DPS and within the Penobscot SHRU. The Pleasant River watershed is actively managed by the Service, the National Marine Fisheries Service, and the Maine Department of Marine Resources (MDMR) to facilitate recovery of endangered Atlantic salmon in this watershed.

Although there is no Atlantic salmon spawning or rearing habitat mapped in either of the unnamed tributaries in the action areas, both Atlantic salmon spawning and rearing habitat are mapped and have been surveyed throughout the Middle Branch Pleasant River and throughout the Pleasant River watershed. A model developed to predict the occurrence and density (i.e., high, medium, low) of juvenile Atlantic salmon rearing habitat within perennial streams of the GOM DPS predicts the occurrence of high-density rearing habitat near the project site (Wright et al. 2008). Given the small size (stream width and water depth) of the project location on first order tributary stream, this site is not expected to provide spawning habitat for Atlantic salmon.

In an effort to increase future adult returns to the Pleasant River watershed for spawning, Atlantic salmon eyed eggs have been recently stocked each year into appropriate rearing habitat in the Pleasant River and its tributaries in various locations. The closest egg planting to the project area occurred in 2020 and 2021 in the Middle Branch Pleasant River approximately 1.6 miles from the action area. Given ongoing recovery efforts for Atlantic salmon in the Penobscot SHRU, stocking in the Pleasant River watershed is expected to continue. Given the egg stocking in the Middle Branch Pleasant River, the MDMR believes it is possible that small numbers of juvenile Atlantic salmon could occur at or near the project site (P. Ruksznis, Maine Department of Marine Resources, pers. comm., 2022).

As part of their monitoring of the juvenile Atlantic salmon population in the Pleasant River watershed, the MDMR periodically conducts electrofishing surveys in Middle Branch Pleasant River and other tributaries of the Pleasant River. Atlantic salmon parr and young-of-the-year (YOY) are routinely detected in Middle Branch Pleasant River. During the most recent electrofishing surveys in 2018, 2019, and 2021, both parr and YOY were detected in the Middle Branch Pleasant River at river kilometer 6.34.

Redd surveys are not completed in the unnamed tributaries, however, the Middle Branch Pleasant River contains suitable spawning habitat further downstream and is regularly surveyed by MDMR for redds. The nearest redd was found in 2020 Middle Branch Pleasant River at river kilometer 5.34. It is unknown if natural spawning provides Atlantic salmon juveniles, in addition to those from restoration stocking activities, that could move in the project action area

to utilize juvenile rearing habitat.

VII. Effects of the Action

Based on our analysis of the information provided in your biological evaluation for the Pine State Timberlands LLC project, the Service concurs that the proposed project will result in adverse effects to Atlantic salmon and critical habitat within the unnamed tributaries of Middle Branch Pleasant River. These adverse effects are due to stressors associated with the installation of cofferdams, stream dewatering, sedimentation, and disturbing or handling Atlantic salmon during fish evacuation activities. These adverse effects will all be relatively short-term during the proposed construction activities.

In the long term, this project will result in beneficial effects to Atlantic salmon and their critical habitat by replacing poorly designed road-stream crossings that are having negative effects on both fish passage and natural stream function. Replacement of these stream crossings and restoration of natural stream channels will allow natural movements of Atlantic salmon and other fish species in the unnamed tributaries of Middle Branch Pleasant River and will improve natural stream functions, like the downstream movement of sediment and woody debris.

VIII. Cumulative Effects

Cumulative effects include the effects of future State, local, or private (non-Federal) actions that are reasonably certain to occur in the action area considered in this Opinion. A non-Federal action is “reasonably certain” to occur if the action requires the approval of a State or local resource or land-control agency, such agencies have approved the action, and the project is ready to proceed. Other indicators which may also support such a “reasonably certain to occur” determination include whether a) the project sponsors provide assurance that the action will proceed; b) contracting has been initiated; c) State or local planning agencies indicate that grant of authority for the action is imminent; or d) where historic data have demonstrated an established trend, that trend may be forecast into the future as reasonably certain to occur. These indicators must show more than the possibility that the non-Federal project will occur; they must demonstrate with reasonable certainty that it will occur. 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 Act and would be consulted on at a later time.

Cumulative effects are described on pages 76 through 77 of the Tier 1 PBO and are hereby incorporated by reference. Since issuance of the Service’s PBO, there have been no substantial changes in the cumulative effects associated with the action areas for the Pine State Timberlands LLC project location in TB R11 WELS, Maine.

IX. Conclusions

The Service concludes that the proposed Pine State Timberlands LLC stream crossing replacement project in TB R11 WELS, Maine is consistent with the Tier 1 PBO for effects to Atlantic salmon and Atlantic salmon critical habitat. After reviewing site specific information including 1) the scope of the Federal action; 2) the environmental baseline; 3) the status of Atlantic salmon in the Pleasant River watershed and the potential occurrence of Atlantic salmon within the project action area; 4) the status of Atlantic salmon critical habitat within the project

action area; 5) the effects of the project; and 6) any cumulative effects, it is the Service's biological opinion that the proposed Pine State Timberlands LLC project is not likely to jeopardize the continued existence of the GOM DPS of Atlantic salmon throughout all or a significant portion of its range. Furthermore, the proposed action is not expected to result in the destruction or adverse modification of Atlantic salmon critical habitat. In reaching these conclusions, the Service considered the best available scientific and commercial information regarding Atlantic salmon and the likely effects of the proposed action on this species and their critical habitat.

X. Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined in section 3 of the ESA as to 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 Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns including breeding, feeding, or sheltering (50 CFR § 17.3). 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 if such taking is in compliance with the terms and conditions of this incidental take statement.

The NRCS (or their client and contractor) will be implementing all pertinent Reasonable and Prudent Measures and implementing Terms and Conditions that are stipulated in the Tier 1 PBO ITS (pages 82 through 83 of the PBO), which will minimize the anticipated incidental take of Atlantic salmon. If the amount or extent of incidental take outlined in this Tier 2 Opinion is exceeded for the Pine State Timberlands LLC project, the NRCS will expeditiously reinstate consultation with the Service.

The Service anticipates that there may be both lethal and non-lethal take of juvenile Atlantic salmon as a result of the proposed action addressed in this Opinion. Incidental take caused by the adverse effects of the proposed action may include the following: 1) the capture, handling, and relocation of juvenile fish during instream work area isolation and dewatering, 2) the death of juvenile Atlantic salmon as a result of capture techniques, including electrofishing, 3) the death of juvenile Atlantic salmon left stranded inside of dewatered cofferdams, 4) the death of juvenile Atlantic salmon through crushing during placement of the cofferdams, and 5) the effects of turbidity from cofferdam installation and removal. The following discussion summarizes the anticipated amount of incidental take associated with these activities, as derived from the analysis and discussion in Section IV of the November 21, 2011 PBO (pages 50 through 56).

The NRCS estimates approximately 800 square feet of temporary stream impact during construction activities at Site #62114 and approximately 900 square feet of temporary stream impact during construction activities at Site #62115. A total of 1700 square feet of temporary stream impact will occur between the two proposed construction sites. This area of stream channel disturbance is equivalent to about 1.58 Atlantic salmon habitat units (one unit = 100 square meters or about 1,076 square feet).

As summarized above in the Environmental Baseline, we expect that a small number of Atlantic salmon juveniles could be present in the unnamed tributaries of Middle Branch Pleasant River. While no Atlantic salmon electrofishing surveys have been conducted in the unnamed tributary, several surveys have been completed in Middle Branch Pleasant River in recent years. The average density of Atlantic salmon juveniles in Middle Branch Pleasant River from surveys in 2019 and 2021 is 42.9 juveniles per habitat unit. This average density represents the best available scientific information to determine the likely number of Atlantic salmon juveniles that could be exposed to stressors that may result in incidental take.

Therefore, the Service authorizes the take of up to 68 juvenile Atlantic salmon during construction of the Pine State Timberlands LLC project ($1.58 \text{ HU} \times 42.9/\text{HU}=67.78$, rounded up to 68 juvenile). This ITS specifically does not authorize the take (lethal or non-lethal) of any **adult** Atlantic salmon. If take of an adult Atlantic salmon becomes a concern during this project, all activities that may be contributing to this concern – particularly instream construction activities – should immediately cease and the Service should be contacted to discuss next steps. Reinitiation of section 7 consultation may be necessary, depending on the circumstances.

As required by the PBO, the NRCS is required to submit an annual report to the Service that summarizes all work conducted under the PBO. This report will account for incidental take associated with each project (including the Pine State Timberlands LLC project), as well as a cumulative accounting of all take of Atlantic salmon authorized under the PBO and subsequent Tier 2 Opinions since 2011.

XI. Reinitiation Notice

This concludes formal consultation on the actions outlined in the January 23, 2023 request from the NRCS. As provided in 50 CFR § 402.16, 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 if 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; 3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any actions causing such take must immediately cease pending reinitiation. Requests for reinitiation or questions regarding reinitiation should be directed to the Service's Maine Field Office.

XII. Conservation Recommendations

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of 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 an action on listed species or critical habitat, to help implement recovery plans, or to develop information. Conservation recommendations are provided in the PBO (page 84) and are hereby incorporated by reference.

XIII. Literature Cited

- U.S. Fish and Wildlife Service. 2017. Final biological opinion to the U.S. Army Corps of Engineers, Federal Emergency Management Agency, and U.S. Fish and Wildlife Service on stream connectivity restoration activities to benefit Atlantic salmon recovery in Maine. Maine Field Office, East Orland, Maine. 93 pp.
- Wright, J., J. Sweka, A. Abbott, and T. Trinko. 2008. GIS-Based Atlantic Salmon Habitat Model (Draft). Appendix C in: NOAA Fisheries (National Marine Fisheries Service). 2009. Biological valuation of Atlantic salmon habitat within the Gulf of Maine Distinct Population Segment. NOAA National Marine Fisheries Service, Northeast Regional Office, Gloucester, MA.