# United States Department of the Interior

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April 18, 2023

Ms. Denise Nelson
National Park Service, Appalachian National Scenic Trail
P.O. Box 50
Harpers Ferry, West Virginia 25425

Dear Ms. Nelson:

The enclosed document contains a biological opinion (Opinion) and concurrence letter 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 replacement of an existing culvert on Henderson Brook on the federally endangered Atlantic salmon (*Salmo salar*), the federally endangered northern long-eared bat (*Myotis septentrionalis*), and the federally threatened Canada lynx (*Lynx canadensis*) and designated critical habitat for salmon and lynx. This project is on the Katahdin Iron Works Road in T7 R9 NWP, Penobscot County, Maine. The purposes of the project are to improve stream habitat connectivity and function in support of watershed-wide efforts to recover the Atlantic salmon and to improve road safety associated with an aging culvert.

In the enclosed Opinion, the Service concludes that the proposed action is not likely to jeopardize the continued existence of Atlantic salmon or result in adverse modification of its critical habitat. As required by section 7 of the ESA, the Service is providing an incidental take statement with this Opinion. The 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.

Additionally, we provide concurrence with the National Park Service's determination that the proposed action is not likely to adversely affect the northern long-eared bat, Canada lynx, and lynx critical habitat.

The Service appreciates your cooperation on this consultation. Please contact Wende Mahaney by email at *Wende_Mahaney@fws.gov* or by telephone at 207/902-1569 if you have any questions regarding this consultation.

Sincerely,

AMANDA CROSS Digitally signed by AMANDA CROSS
Date: 2023.04.18 14:36:09 -04'00'

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

cc: Scott Craig, USFWS
Marian Orlousky, Appalachian Trail Conservancy
Daniel Hale, Appalachian Trail Conservancy
Peter Ruksznis, MEDMR

**CONCURRENCE LETTER AND**
**BIOLOGICAL OPINION**
**FOR THE HENDERSON BROOK CULVERT REPLACEMENT PROJECT IN THE HUNDRED-MILE WILDERNESS, KATAHDIN IRONWORKS ROAD,**
**PISCATAQUIS COUNTY, MAINE**
**APPALACHIAN NATIONAL SCENIC TRAIL, NATIONAL PARK SERVICE**
**PROJECT CODE: 2022-0029262**


**U.S. FISH AND WILDLIFE SERVICE**
**MAINE-NEW HAMPSHIRE FISH AND WILDLIFE SERVICE COMPLEX**
**MAINE FIELD OFFICE**
**EAST ORLAND, MAINE**


Approved by: AMANDA CROSS Digitally signed by AMANDA CROSS Date: 2023.04.18 14:36:46 -04'00'
Amanda S. Cross, Project Leader

This concurrence letter and biological opinion (BO, which starts below on p. 5) is provided in response to the request from the National Park Service (Appalachian National Scenic Trail) (NPS ANST) to initiate informal and formal consultation pursuant to section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). This concurrence letter and BO is based on information provided in the November 8, 2022, jointly developed biological assessment (BA) and other sources of information, and was completed pursuant to the November 16, 2016, U.S. Fish and Wildlife Service (Service) policy on *Streamlined Consultation Guidance for Restoration/Recovery Projects* and associated documents.

The NPS ANST, in collaboration with the Appalachian Trail Conservancy, the Appalachian Mountain Club, and the Service's Maine Fish and Wildlife Conservation Office (MEFWCO), is proposing to replace an undersized and perched culvert on Henderson Brook with a substantially wider bridge and restore a short section of the stream channel (about 100 feet). The MEFWCO is providing funding and technical assistance to support this project.

While a primary goal of this project is to restore aquatic organism passage in the Henderson Brook watershed, particularly to benefit the federally endangered Atlantic salmon (*Salmo salar*) and the brook trout (*Salvelinus fontinalis*), this project will also result in more resilient road infrastructure on a portion of the Katahdin Ironworks Road, an unpaved road which is heavily used for both recreational and forestland management activities.

This culvert replacement project is within the geographic range of the endangered Atlantic salmon Gulf of Maine Distinct Population Segment (GOM DPS) (*Federal Register* 2009, 29344) and is also located within designated critical habitat for salmon (*Federal Register* 2009a, 29300; *Federal Register* 2009b, 39903). The NPS ANST has determined that the proposed action is likely to adversely affect Atlantic salmon, given their known presence in the action area, and not likely to adversely affect salmon critical habitat.

The proposed action is also within the range of the federally endangered northern long-eared bat (*Myotis septentrionalis*) and the federally threatened Canada lynx (*Lynx canadensis*), as well as designated critical habitat for the lynx. The NPS ANST has determined that the proposed project is not likely to adversely affect the Canada lynx and its critical habitat and the northern long-eared bat. Based on the discussion provided below, we concur with these determinations for the Canada lynx and the northern long-eared bat.

**Canada lynx and critical habitat**

The Henderson Brook crossing of the Katahdin Ironworks Road occurs within a very large forest landscape (predominately northern hardwood forest) that could provide some habitat for lynx. According to the Maine Department of Inland Fisheries and Wildlife Canada Lynx Assessment (Vashon et al. 2012), lynx have been observed in proximity to the action area, and winter track surveys have noted lynx tracks in nearby townships (see Figure 9 and Figure 10 in the NPS Biological Assessment).

During construction of the project, which will occur over an estimated five to ten consecutive days in the summer, individual Canada lynx may be exposed to effects from construction-related disturbance, including possible injury or mortality from collision with a construction vehicle, such as a dump truck. The Katahdin Ironworks Road already receives regular heavy vehicle traffic associated with forest management activities in the region, as well as regular passenger vehicle traffic associated with a variety of recreational activities including hiking and camping.

During construction of the proposed bridge, the increase in vehicle traffic on the road is expected to be very minimal compared to normal summer vehicle traffic and will occur only during daylight hours, avoiding dawn, dusk, and night when lynx are more active. The NPS will limit construction vehicles to driving less than 10 miles per hour within the project area to further limit the exposure of lynx to vehicle collisions. Exposure to construction-related noise and other disturbances will occur within a relatively small area around the culvert replacement site at Henderson Brook, at the materials staging area at the nearby Gulf Hagas hiking trail parking lot, and along the approximately one-half mile section of road between these two locations. Given the small footprint of the area subject to construction-related noise and disturbance, the short timeframe of disturbance (five to ten days and only during daylight hours), and the abundant area of surrounding forest habitat where lynx could readily move to avoid disturbance, any effects to individual lynx from construction activities are expected to be very minor or insignificant.

Effects to lynx critical habitat would also be very small. The anticipated area of construction disturbance associated with the replacement of the culvert is only about 0.3 acres, with most of this area being within the existing roadbed. Removal of vegetation from the adjacent forest will be minimal and include only a few trees and shrubs. Given the very small footprint of construction disturbance in the forest adjacent to Henderson Brook, effects to lynx critical habitat are expected to be insignificant. The new bridge structure, which will be much wider than the existing culvert and include stream banks, may allow lynx to travel up and down the riparian corridor under the Katahdin Ironworks Road rather than needing to cross over the road, thus reducing exposure to vehicle collision risk.

In conclusion, we find that all effects to Canada lynx and their critical habitat are insignificant. Therefore, we concur with the NPS's determination that the proposed action is not likely to adversely affect lynx and their critical habitat.

**Northern long-eared bat**

The proposed project site is in an area where northern long-eared bats may occur based on a nearby acoustic detection and an occupancy model developed for the Maine Department of Inland Fisheries and Wildlife (MEDIFW) using data from acoustic bat surveys conducted between 2015-2020 (de la Cruz 2022). This species is associated with forested habitats, using trees as daytime roost sites and foraging for insects at night by flying through the forest understory.

The proposed project will require that a small number of trees are cut down to accommodate the much wider new bridge and to allow for construction equipment to adequately navigate the project site. The total area of tree clearing will be less than 0.3 acres.

All trees were cut down during the week of March 20, 2023, which is before the start of the bat active season in Maine (April 15 to October 31). However, should circumstances delay tree removal until later in the summer when the bridge construction will happen, bats (older juveniles and adults) could be roosting in these trees and exposed to disturbance and the possibility of injury or death when a tree is cut down. Given the impacts of white-nose syndrome on bats in Maine, however, we expect very few northern long-eared bats, if any, to be present in the project area during project construction. During acoustic bat surveys from 2015 to 2022 on state-owned lands throughout Maine, the MEDIFW only detected likely presence of northern long-eared bat at 126 of 854 detector locations (de la Cruz 2022); occupancy modeling indicates that northern long-eared bats currently only occupy about 0.3 percent of Maine (99.6 $mi^2$). In 2021, an acoustic survey detected northern long-eared bat at a location approximately 2.75 miles east of the Henderson Brook culvert. Tree clearing in March through mid-April would have no effects on bats as they would still be in their hibernaculum at this time and not roosting in trees.

Given that 1) northern long-eared bats are expected to be very rare in the general project area, 2) only a few trees will be cut down, 3) the small size of the overall construction footprint, and 4) tree clearing is planned to happen between mid-March and April 14, we conclude that effects to individual bats from cutting down trees and from construction noise and disturbance are extremely unlikely to occur or discountable. Furthermore, effects to bat habitat from the loss of a few trees are expected to be negligible or insignificant. Therefore, we concur with the NPS's determination that the proposed action is not likely to adversely affect the northern long-eared bat.

**Literature Cited**

De La Cruz, J.L. 2022. Stationary acoustic bat survey report and recommendations for the Maine Department of Inland Fisheries and Wildlife. Conservation Management Institute, Virginia Tech, Blacksburg, VA. 53pp.

Vashon J., S. McLellen, S. Crowley, A. Meehan, and K. Laustsen. 2012. Canada lynx assessment. Maine Department of Inland Fisheries and Wildlife Research and Assessment Section. Bangor, ME. 77 pp. plus Appendices.

# BIOLOGICAL OPINION

## 1.0 DESCRIPTION OF THE PROPOSED ACTION

The NPS ANST proposes to replace the existing undersized and perched Henderson Brook culvert on the Katahdin Ironworks Road with a bridge that features a 70-foot deck and 67.5-foot clear span, restoring natural flows and substrate dynamics (Figure 1). The existing corrugated metal culvert is 46 feet long and 10.5 feet wide and is perched above the stream bed. This culvert is a remnant of decades-old logging activity in the area and was present when the NPS purchased the land around Henderson Brook to protect the Appalachian Trail corridor in the early 1980s. This culvert is considered a complete obstruction to upstream movement of aquatic organisms, including fish (Figure 2).

The Service's MEFWCO is providing funding and technical assistance to support this aquatic connectivity project. For example, in August 2021the MEFWCO collected water samples from two locations in Henderson Brook downstream of the culvert to look for environmental DNA indicative of Atlantic salmon. Both samples contained Atlantic salmon DNA in relatively high concentration, confirming the suspected presence of salmon in the project area given known spawning and stocking activities nearby in the West Branch Pleasant River.

Conservation partners, including the Appalachian Mountain Club, have engaged in extensive efforts to remove barriers to fish passage within West Branch Pleasant River tributaries and larger downstream waters. This project is the next logical step for salmon and brook trout recovery. The removal of the culvert under the road and replacement with a clear-span bridge is the best identified approach to mitigating road stream crossing barriers to fish passage in the Atlantic Salmon Recovery Plan Companion Document (Service and NMFS 2018). Replacement of the culvert with a steel and concrete bridge will also reduce long-term road maintenance needs. This stream crossing represents the final barrier to opening the entire length of Henderson Brook to Atlantic salmon and other native fish species such as brook trout. This proposed action would reconnect the 3.4 miles (88%) of Henderson Brook that have already been restored to the West Branch Pleasant River.

The Appalachian Trail footpath currently runs parallel to Henderson Brook at the Katahdin Ironworks Road crossing. The trail will be temporarily relocated during this project to avoid construction activities, including 200 feet on the north side of the road and 375 feet on the south side. The temporary relocation route will follow side-hill contours as much as possible and will not include any tree removal. The "new stone stairs for trail realignment" noted on the project plan-set will not be implemented during the culvert replacement project. An optimal trail realignment will instead be constructed in the future once funding for a full trail assessment and relocation becomes available.

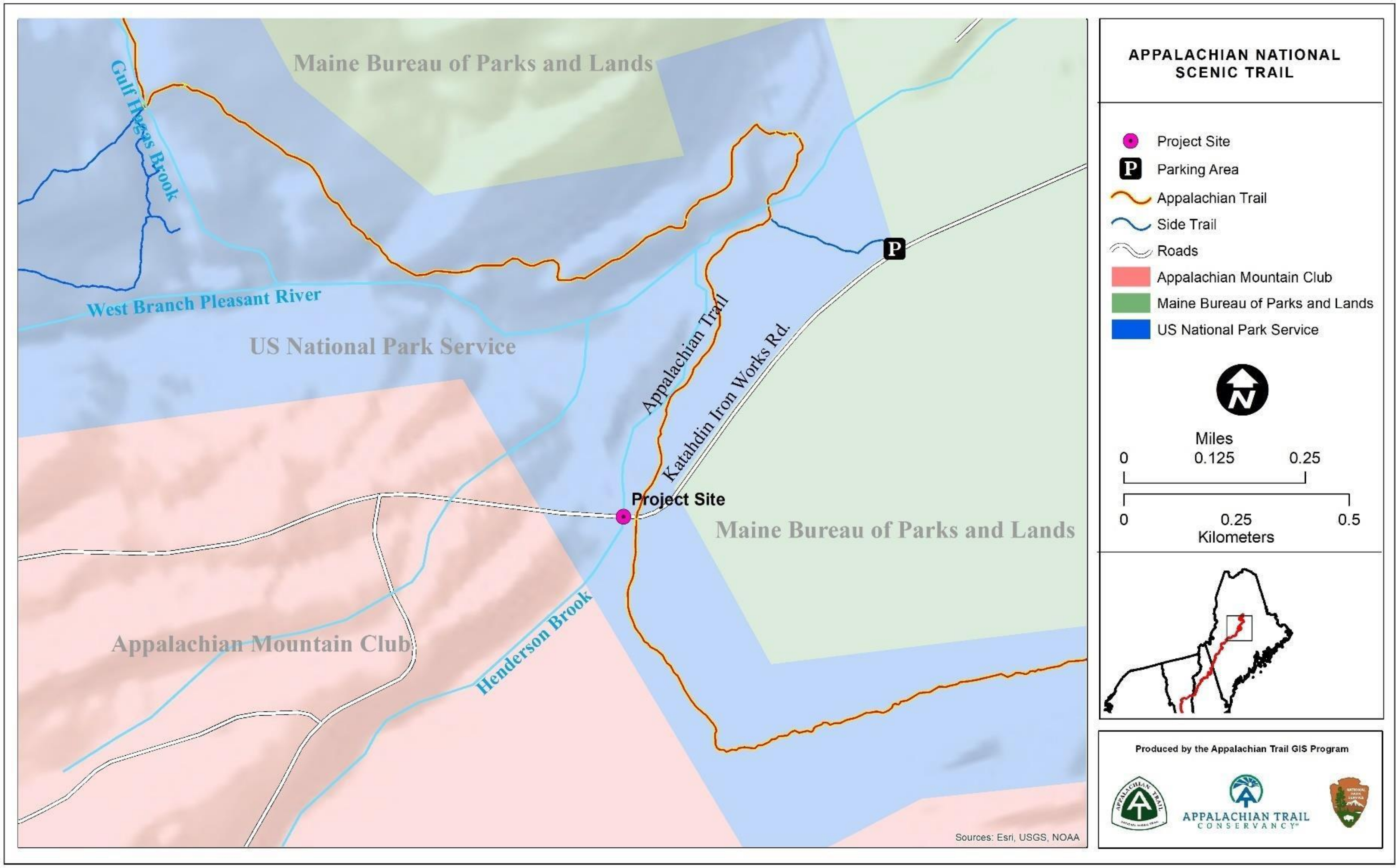


Figure 1. The proposed culvert replacement on Henderson Brook in Bowdoin College West Grant Township, Piscataquis County, Maine. (*Map produced by Appalachian Trail GIS Program for the NPS ANST Biological Assessment)*

Figure 2. Existing perched culvert outlet at Henderson Brook on the Katahdin Ironworks Road.

This project was designed following the principles of the U.S. Forest Service's Stream Simulation methodology for road-stream crossing structures (USFS 2008) and the Service's programmatic ESA section 7 consultation aimed at facilitating stream connectivity restoration activities to benefit Atlantic salmon recovery (Service 2017)[1]. As such, the proposed project will achieve full aquatic organism passage within Henderson Brook above the Katahdin Ironworks Road and restore approximately 100 feet of degraded stream bed, which will benefit Atlantic salmon and their critical habitat, particularly rearing habitat for juveniles.

More design details are provided in the NPS ANST's BA and the attached plan set and are incorporated here by reference. Design details reflective of the Stream Simulation approach include the following:

- Structure width – The new bridge was designed based on a reference reach bankfull width of 28 feet, which was determined based on a combination of stream survey work and a hydraulic model (HEC-RAS) of the stream system developed by the design engineer. The new bridge is designed to have a width (at bankfull or top of bank elevation) at least 1.2 times the reference reach bankfull width of 28 feet.
- Structure alignment – The bridge would achieve optimal alignment relative to both the road and the stream channel. The bridge is aligned with the road surface and the simulated stream channel matches the angle of the existing stream channel on either side of the road.
- Structure capacity – The bridge has been designed to pass a 100-year flood event with sufficient extra vertical clearance for wood and sediment transport.
- The simulated stream channel slope through the restored section matches the surveyed reference reach slope of 6.6%. The reconstructed stream bed includes boulder grade control structures to provide for a stable channel that retains an appropriate mix of substrate sizes.
- To reduce the risk of scour, the bridge footings are designed to be stable for the maximum scour depth based on the stream survey.
- A pebble count was conducted during the stream survey to inform the design of the reconstructed stream bed and ensure that the substrate sizes and distribution match the natural stream channel and its bed mobility characteristics.

## 1.1 CONSERVATION MEASURES

Several conservation measures are incorporated into this project to ensure that effects to Atlantic salmon and its critical habitat are avoided or minimized as much as possible, particularly during construction activities. These conservation measures, taken verbatim from the BA (except for 16., which was added by the NPS ANST after further consultation with the Service), are:

1. The National Park Service and/or their agent will hold a pre-construction meeting with the contractor(s) to review all procedures and requirements for avoiding and minimizing effects

[1] This project does not qualify for use of the Service's stream crossing programmatic consultation process due to the steepness of Henderson Brook in the project area (6.6%). The design standards in this programmatic process require stream slopes of no more than 3.5%.

to Atlantic Salmon and their critical habitat. This meeting will also emphasize the importance of these measures for protecting salmon and its critical habitat. The U.S. Fish and Wildlife Service (USFWS) staff will be notified of and invited to attend this meeting as practicable.

2. Prior to the installation of cofferdams, the permittee shall install block nets across the channel at upstream and downstream locations outside of the construction zone and leave them in a secured position to exclude Atlantic salmon from entering the project area. Nets shall be secured to the stream channel bed and banks until construction activities within the stream channel are complete. If block nets remain in place more than one day, the permittee shall monitor the nets at least on a daily basis to ensure they are secured to the bed and banks and are free of organic accumulation.

3. To minimize dewatering-related fish stranding inside the cofferdams, staff from either the Maine Department of Marine Resources or the USFWS will capture and remove as many Atlantic salmon and other fish species as possible. Atlantic salmon trapped within the isolated work area will be captured using techniques to minimize the risk of injury, then released at a safe release site, preferably upstream of the isolated reach in a pool or other area that provides cover and flow refuge. Fish evacuation will include one or a combination of methods to most effectively capture Atlantic salmon juveniles and other fish while minimizing harm. When multiple methods are used, fish evacuation shall proceed from the least invasive method to most invasive, culminating with electrofishing. Site conditions and other logistics may dictate the practicality of the methodology(ies) used.

4. All in-stream work must be carried out during low stream flows, between July 15th and September 30.

5. The project soil erosion and sediment control measures will be constructed and maintained in accordance with the Maine Erosion and Sediment Control Best Management Practices Manual (MDEP 2016) and the Maine Erosion and Sediment Control Practices Field Guide for Contractors (MDEP 2014). The work will also follow all erosion and sediment control measures, groundwater protection measures, cover stabilization measures, stream and wetland protection measures and inspection and maintenance measures as outlined in the Design Documents for this project.

6. A Soil Erosion and Water Control Plan (SEWPCP) is included in the Design Documents for this project. All construction activities for the project will be conducted in accordance with this plan in order to minimize the potential for effects to Atlantic salmon and its critical habitat. In stream turbidity will be visually monitored and all erosion controls will be inspected daily to ensure that the measures taken are adequate. If inspection shows that the erosion controls are ineffective, immediate action will be taken to repair, replace, or reinforce controls as necessary.

7. All areas of temporary waterway will be restored to their original contour and character upon completion of the project.

8. To prevent entrainment and impingement of Atlantic salmon juveniles related to water diversions using a bypass pump system and during the initial dewatering of the cofferdams, the

permittee or their contractors shall use a screen on each pump intake sufficiently large enough so that the approach velocity does not exceed 6.10 meters per second (0.20 feet per second). Square or round screen face openings are not to exceed 2.38 millimeters (approximately 3/32 inch) and slotted face openings will not exceed 1.75 millimeters (approximately 1/16 inch) in the narrow direction. Intake hoses shall be regularly monitored while pumping to minimize adverse effects to Atlantic salmon.

9. All materials used for stream diversion and flow control must be completely removed from stream area upon completion of the culvert replacement so that fish and other aquatic organism passage is not unnecessarily restricted. Temporary erosion control measures shall be removed within 30 days after permanent stabilization.

10. Removal of vegetation and soil disturbance will be kept to a minimum while allowing proper site development. All disturbed areas shall be permanently stabilized with rip rap or native vegetation appropriate for riparian areas in Maine. For seeded areas, stabilization means 90% coverage of the disturbed area with mature, healthy plants with no evidence of washing or rilling of the topsoil. For sodded areas, stabilization means the complete binding of the sod roots into the underlying soil with no slumping of the sod or die-off.

11. To minimize the spread of noxious weeds into the riparian zone, all off-road equipment and vehicles (operating off of existing open and maintained roads) must be cleaned prior to entering the construction site to remove all soil, seeds, vegetation, or other debris that could contain seeds or reproductive portions of plants. All equipment will be inspected prior to off-loading to ensure that they are clean.

12. As a component of the Soil Erosion and Water Pollution Control Plan (SEWPCP), the permittee or his contractor will develop and implement a Spill Prevention Control and Countermeasure Plan (SPCCP) designed to avoid any stream impacts from hazardous chemicals associated with construction activities, such as diesel fuel, oil, lubricants, and other hazardous materials. All re-fueling or other construction equipment maintenance will be done at a location consistent with SPCCP and in a manner that avoids chemical or other hazardous materials reaching the stream. These measures include the following:

a. All vehicle and equipment re-fueling activities shall occur more than 100 feet from any waterway or water body.

b. All vehicles carrying fuel shall have specific equipment and materials needed to contain or clean up any incidental spills at the project site. Equipment and materials will include spill kits appropriately sized for specific quantities of fuel to be used, as well as shovels, absorbent pads, straw bales, containment structures and liners, and/or booms.

c. During use, all pumps and generators shall have appropriate spill containment structures and/or absorbent pads in place.

d. All equipment used for in-stream work shall be cleaned of external oil, grease, dirt, and mud. Any leaks or accumulations of these materials will be removed before entering streams or areas that drain directly to streams or wetlands.

13. Concrete will not directly contact the waterbody. The contractor shall not wash tools, forms, or other items in or adjacent to a waterbody or wetland. Work will not be conducted during a significant rain event and shall not resume until flows in the waterway have returned to normal levels.

14. A small number of trees with three inch or greater diameter at breast height must be cut down within the action area. The cumulative area of trees removed will be less than 0.3 acres. In order to minimize potential impacts to northern long-eared bats, no tree (3 inches or larger diameter at breast height) cutting shall occur between June 1 and July31. Contractor is to take special care not to damage trees within the construction area unless noted for removal.

15. A post-project report, confirming completion of construction and the successful application of all terms and conditions of the permit, shall be submitted to the U.S. Fish and Wildlife Service (USFWS) within four (4) weeks of the project's completion. The report shall include, but not be limited to, a narrative and photos documenting project elements outlined in the construction plan and referenced in these conditions as well as the amount of incidental take of Atlantic salmon.

16. The National Park Service will post the new bridge with a sign informing the public that recreational fishing from the bridge is prohibited pursuant to 36 CFR 2.3(d)(8).

## 2.0 ACTION AREA

The Action Area is defined (50 CFR 402.02) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

The action area for the proposed project includes construction at the intersection of Henderson Brook and the Katahdin Ironworks Road, a downstream reach of 1000 feet below the construction that may be affected by sedimentation, a staging area east of the construction site at the Gulf Hagas parking area and the 0.5 miles of road between these two points, and a temporary relocation of the Appalachian Trail footpath on the north and south sides of the road. The action area also includes the entire 3.5-mile upstream extent of Henderson Brook, since replacement of the existing culvert will restore upstream fish passage to the entire extent of the brook, at least as far upstream as Atlantic salmon are able to naturally move. A small section of stream channel upstream of the road (less than 100 feet) will also be temporarily affected during instream construction activities.

Bridge construction activities will take place within an approximately circular area with a diameter of roughly 120 feet, for a total area less than 0.3 acres. Stream flow will be diverted around the instream work site by the installation of upstream and downstream sandbag cofferdams and the use of a pumping system. Construction activities will take place within a stream reach approximately 100 feet in length. The primary disturbance will be centered on the existing Katahdin Ironworks Road. Very little disturbance is expected outside of the existing road footprint. Removal of sod, trees, bushes and other vegetation and soil disturbance will be kept to a minimum while allowing proper site development. The contractor is to take special care not to damage trees within the construction area unless noted for removal.

Temporary sediment impacts may extend as far as 1000 feet downstream of the downstream coffer dam. With a stream width of approximately 28 feet, the proposed action will impact approximately 30,800 square feet of stream channel, or 0.71 acres. Approximately 2,800 square feet of stream channel will be dewatered to facilitate construction.

The materials staging area will be located outside NPS ANST lands at the Maine Bureau of Parks and Lands (MEBPL) Gulf Hagas Parking Area approximately 0.5 miles to the east of the project site. The Katahdin Ironworks Road would be used to transport bridge components and gravel via dump trucks and multi-axel trailers.

The Appalachian Trail will be temporarily relocated so hikers can avoid construction activity. The trail will be relocated for about 200 feet on the north side of the road and 375 feet on the south side, for a total of 575 feet. The temporary relocation route will follow side-hill contours as much as possible and will not require removal of any trees.

Figure 3 shows, in general, the action area for the proposed project.


Figure 3. Detailed context for project action area showing bridge site, parking area used for staging materials, 1000-foot downstream reach that may be affected by sedimentation, and temporary Appalachian Trail footpath relocation. (*Map produced by Appalachian Trail GIS Program for the NPS ANST Biological Assessment)*

## 3.0 STATUS OF THE SPECIES AND CRITICAL HABITAT

This BO presents the Service's review of the status of each listed species considered in this consultation, the condition of designated critical habitat, and the environmental baseline for the action area. This section defines 1) the biological requirements of each listed species affected by the proposed action and 2) the requirements of each designated critical habitat.

## 3.1 STATUS OF THE GOM DPS OF ATLANTIC SALMON

The abundance of Atlantic salmon has been generally declining since the 1800s (Fay et al. 2006). Data sets tracking adult abundance are not available throughout this entire period; however, a comprehensive time series of adult returns of Atlantic salmon dating back to 1967 exists (Fay et al. 2006, USASAC 2001–2022, Figure 4). It is important to note that contemporary abundance levels of Atlantic salmon are several orders of magnitude lower than historical abundance estimates. For example, Foster and Atkins (1869) estimated that roughly 100,000 adult Atlantic salmon returned to the Penobscot River alone before the river was dammed, whereas contemporary estimates of abundance for the entire Atlantic salmon GOM DPS have rarely exceeded 5,000 individuals in any given year since 1967 (Fay et al. 2006, USASAC 2022). Contemporary abundance estimates are informative in considering the conservation status of the Atlantic salmon today.

After a period of population growth in the 1970s, adult returns of Atlantic salmon declined steadily between the early 1980s and the early 2000s. Although adult return numbers temporarily improved again from 2008-2011(with a high of 3,125 returns in the Penobscot in 2011), adult returns to the GOM DPS have been at record low numbers since 2012. The population growth observed in the 1970s is likely attributable to favorable marine survival and increases in hatchery capacity, particularly from the construction of Green Lake National Fish Hatchery in 1974. Marine survival remained relatively high throughout the 1980s, and Atlantic salmon populations remained relatively stable until the early 1990s. In the early 1990s marine survival rates decreased, leading to the declining trend in adult abundance observed since then.

Adult Atlantic salmon returns have been very low for many years and remain extremely low in terms of adult abundance in the wild. Further, the most adults return to a single river, the Penobscot, which accounted for 89 percent of all adult returns to the GOM DPS between 2000 and 2021. Of the 3,125 adult returns to the Penobscot River in 2011, the majority were the result of smolt stocking; and only a small portion were naturally reared. The 2011 return number represents the highest value since 1990; however, the subsequent years reflect a continuing and dramatic multi-decadal decline with only 261 returns to the Penobscot in 2014. The 2014 returns represent the lowest value since the early 1970s. More recent data, however, indicates this declining trend has reversed in the Penobscot with the number of returning adults increasing to an average of 862 from 2015 to 2021.

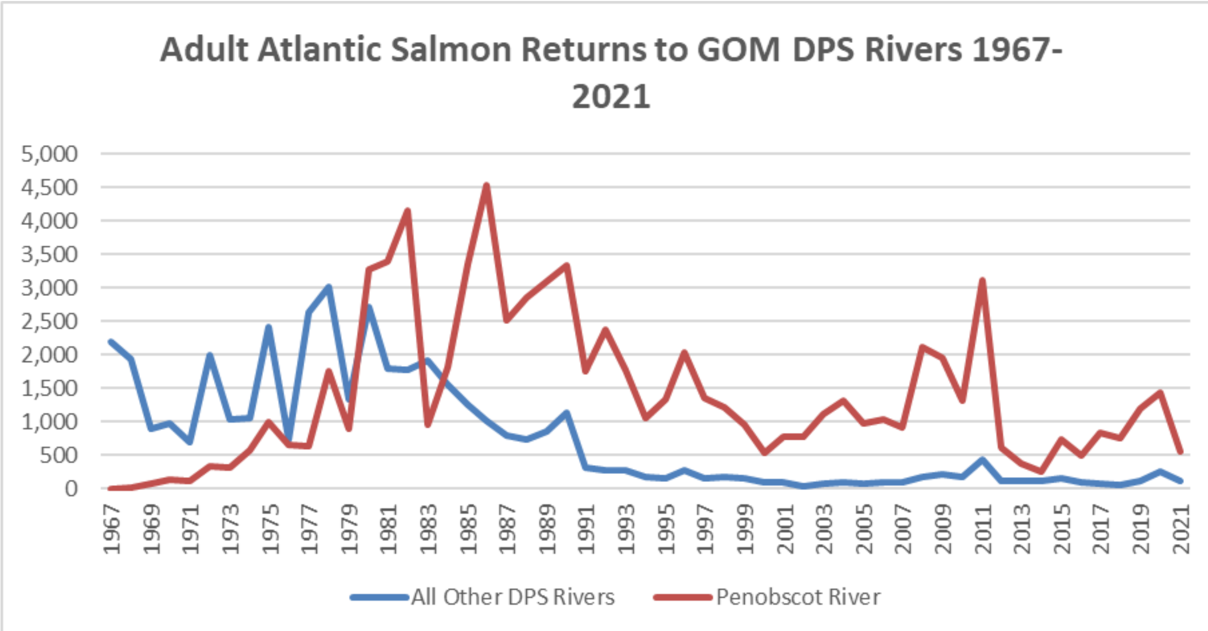


Figure 4. Adult Atlantic salmon returns to the GOM DPS rivers between 1967 and 2021 (Fay et al. 2006, USASAC 2001-2022).

The term naturally reared includes fish originating from both natural spawning and from stocked hatchery fry (USASAC 2012). Hatchery fry are included as naturally-reared because hatchery fry are not marked and, therefore, cannot be distinguished from fish produced through natural spawning. Because of the extensive amount of fry stocking that takes place to recover Atlantic salmon, it is possible that a substantial number of fish counted as naturally reared were stocked as hatchery fry. Low abundances of both hatchery-origin and naturally reared adult Atlantic salmon returns to Maine demonstrate continued poor marine survival, which remains a primary threat to recovery of the GOM DPS (Service and NMFS 2018a). Declines in hatchery-origin adult returns are less sharp because of the ongoing effects of consistent hatchery supplementation of smolts. Generally, most hatchery-reared smolts are released into the Penobscot River– 555,000 in 2019, 648,000 in 2020 and 620,000 in 2021 (USASAC 2020, 2021, 2022). In contrast, the number of returning naturally reared adults continues at very low levels due to poor marine survival. In conclusion, the abundance of Atlantic salmon has been low and either stable or declining over the past several decades. The proportion of adult returns that are of natural origin is small but appears relatively stable (average 23 percent over the 10 years from 2012 to 2021) (USASAC 2022).

The conservation hatchery program has assisted in slowing the decline and helping to stabilize populations at low levels. However, stocking of hatchery products has not contributed to an increase in the overall abundance of Atlantic salmon and yet has not been able to increase the naturally reared component. Abundance remains critically low relative to interim recovery targets of 500 naturally reared adult returns per Salmon Habitat Recovery Unit (SHRU) (Service and NMFS 2018a). Continued reliance on the conservation hatchery program could prevent extinction but will not allow recovery of the Atlantic salmon, which must be accomplished through increases in naturally- reared fish.

Currently, the best strategy identified to address poor marine survival is to maximize production of wild or naturally reared smolts. This strategy can involve improvement in hatchery smolt outcomes towards yielding more natural spawners and ensuring safe downstream passage at hydro-dams for both naturally-reared and hatchery smolts (USASAC 2022).

## 3.2 STATUS OF CRITICAL HABITAT

Coincident with the June 19, 2009, endangered listing, the National Marine Fisheries Service (NMFS) designated critical habitat for the Atlantic salmon (Federal Register 2009a, 29300). The final rule was revised on August 10, 2009 (Federal Register 2009b, 39003). In describing critical habitat for the Atlantic salmon, the NMFS divided the GOM DPS range into three SHRUs, the Penobscot Bay SHRU, the Merrymeeting Bay SHRU and the Downeast Coastal SHRU.

Critical habitat is designated to include perennial rivers, streams, estuaries, and lakes connected to the marine environment with the range of the GOM DPS of Atlantic salmon, except for those areas that are specifically excluded for economic, tribal, or military reasons. Figure 5 shows the extent of critical habitat within the GOM DPS range.

Habitat areas designated as critical habitat within each SHRU are described in terms of habitat units (HUs). One HU represents 1,076 square feet (100 square meters) of suitable Atlantic salmon rearing or spawning habitat. For each SHRU, the NMFS determined using a modeling approach at the hydrologic unit code (HUC) level 10 watershed scale that there was sufficient habitat available within the currently occupied habitat to achieve recovery objectives in the future; therefore, no unoccupied habitat was designated as critical habitat.

The designation of critical habitat for Atlantic salmon uses both the terms primary constituent element (PCE) and physical and biological features (PBFs). Critical habitat for Atlantic salmon is designated to include two PCEs, sites for spawning and rearing and sites for migration. Within each PCE, several essential PBFs are identified as described below.

### 3.2.1 Physical and biological features of sites for spawning and rearing (SR):

SR 1. Deep, oxygenated pools and cover (e.g., boulders, woody debris, vegetation, etc.), near freshwater spawning sites, necessary to support adult migrants during the summer while they await spawning in the fall.

SR 2. Freshwater spawning sites that contain clean, permeable gravel and cobble substrate with oxygenated water and cool water temperatures to support spawning activity, egg incubation, and larval development.

SR 3. Freshwater spawning and rearing sites with clean, permeable gravel and cobble substrate with oxygenated water and cool water temperatures to support emergence, territorial development and feeding activities of Atlantic salmon fry.

SR 4. Freshwater rearing sites with space to accommodate growth and survival of Atlantic salmon parr.

SR 5. Freshwater rearing sites with a combination of river, stream, and lake habitats that accommodate parrs’ ability to occupy many niches and maximize parr production.

SR 6. Freshwater rearing sites with cool, oxygenated water to support growth and survival of Atlantic salmon parr.

SR 7. Freshwater rearing sites with diverse food resources to support growth and survival of Atlantic salmon parr.

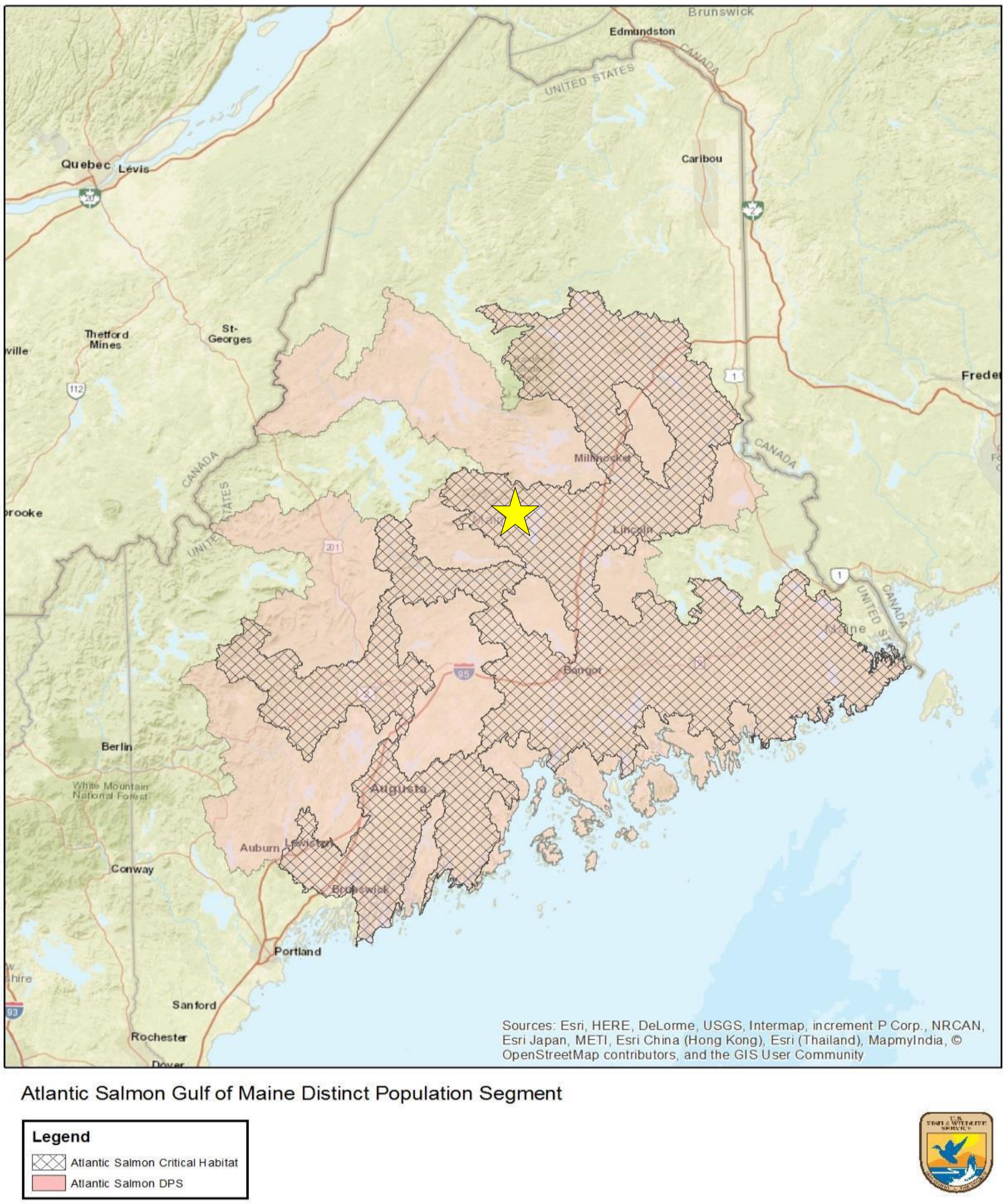


Figure 5. Critical habitat for the Gulf of Maine Distinct Population Segment (GOM DPS) of Atlantic salmon. Project location is represented by a yellow star (*Map as provided in NPS ANST Biological Assessment*).

Physical and biological features of sites for migration (M):

- M 1. Freshwater and estuary migratory sites free from physical and biological barriers that delay or prevent access of adult Atlantic salmon seeking spawning grounds needed to support recovered populations.
- M 2. Freshwater and estuary migration sites with pool, lake, and in-stream habitat that provide cool, oxygenated water and cover items (e.g., boulders, woody debris, and vegetation) to serve as temporary holding and resting areas during upstream migration of adult Atlantic salmon.
- M 3. Freshwater and estuary migration sites with abundant, diverse native fish communities to serve as a protective buffer against predation.
- M 4. Freshwater and estuary migration sites free from physical and biological barriers that delay or prevent emigration of smolts to the marine environment.
- M 5. Freshwater and estuary migration sites with sufficiently cool water temperatures and water flows that coincide with diurnal cues to stimulate smolt migration.
- M 6. Freshwater migration sites with water chemistry needed to support sea water adaptation of smolts.

### 3.2.2 Status of the Critical Habitat

To achieve recovery and delisting of the GOM DPS, each of the three SHRUs must have at least 30,000 HUs within designated critical habitat that are both accessible to natural origin adults for spawning and suitable for rearing of their offspring (Service and NMFS 2018a). Currently, all three SHRUs will need to make improvements to both habitat accessibility and suitability to meet recovery objectives. Only the Downeast SHRU is close to meeting the accessibility requirement with approximately 28,600 HUs being fully accessible (as defined by the Recovery Plan), while the Penobscot SHRU has approximately 18,600 HUs and the Merrymeeting SHRU has approximately 12,400 HUs that are defined as accessible (Downeast SHRU Coordinating Committee 2020). It is unknown at this time, however, how much of this accessible or fully accessible habitat could be defined as suitable.

Throughout the GOM DPS, accessibility to spawning and rearing habitat is currently influenced by both dams without adequate fish passage and poorly designed road stream crossings (although less so in the Downeast SHRU). Suitability of spawning and rearing habitat is influenced by a variety of factors; degraded habitat suitability is linked to generally poor freshwater survival, particularly for juvenile lifestages. Legacy impacts from forestry practices have reduced habitat complexity by, for example, removing boulders, widening channels, and reducing channel depth, disconnecting side channels and reducing the availability of large wood inputs. Dams and poorly designed road stream crossings have reduced or eliminated access to habitat and degraded habitat value by, for example, increasing water temperatures in impoundments and changing sediment transport pattens resulting in embedded stream substrates or reduced availability of pools. In the Penobscot Bay and Merrymeeting Bay SHRUs, fish passage issues associated with hydroelectric dams play a significant role in upstream accessibility to suitable spawning and rearing habitat and for downstream accessibility to the marine environment.

## 4.0 ENVIRONMENTAL BASELINE

## 4.1 STATUS OF ATLANTIC SALMON IN THE ACTION AREA

The action area for the proposed project includes a section of Henderson Brook, which is a perennial tributary of the West Branch Pleasant River. The West Branch Pleasant River is a tributary of the Pleasant River, which in turn is a major tributary of the Piscataquis River and then the Penobscot River. The Pleasant River watershed is actively managed by private conservation organizations, State and Federal agencies, and the Penobscot Indian Nation as part of the overall recovery effort for Atlantic salmon within the Penobscot Bay SHRU. The project site on Henderson Brook is located approximately 1,800 feet upstream of its confluence with the West Branch Pleasant River.

Atlantic salmon management within the Penobscot Bay SHRU is currently influenced by operation of fish lifts at the Milford Hydro-Project and the Orono Hydro-Project, the first dams on the Penobscot River. Returning adult sea-run Atlantic salmon are either collected for use as broodstock for the Service's conservation hatchery program or returned to the Penobscot River to continue their upstream spawning migration.

In 2020 and 2021, 1602 and 561 adult Atlantic salmon returned to the Penobscot River, respectively, based on fishway counts. Most of these adult returns were captured at the Milford fish lift. Of these captured adults, 221 (2020) and 147 (2021) were removed from the river for use as hatchery broodstock. The remainder of the adults were passed upstream into the Penobscot River and allowed to access and spawn in appropriate habitat, such as the West Branch Pleasant River. The five-year average (2016- 2021) for total adult returns to the Penobscot River is 963 salmon (USASAC 2022).

Redd surveys, by foot or canoe, are used in select areas of the Penobscot Bay SHRU to assess Atlantic salmon spawning activity. Both test pits (false-start redds early in the spawning season) and redds are counted, as weather and river conditions allow for surveying within spawning habitat. The Maine Department of Marine Resources (MEDMR) conducts spawning surveys in the Pleasant River watershed, including the East Branch, Middle Branch, and West Branch. In the West Branch Pleasant River, between the outlet of Henderson Brook and the inlet of Silver Lake (downstream), three redds and three test pits were found in 2021 and 28 redds and 32 test pits in 2020. These two years represent a notable increase in spawning activity since a cumulative total of 14 redds and 17 test pits were found in the previous ten years. Juvenile Atlantic salmon produced from spawning in the West Branch Pleasant River could seek appropriate juvenile rearing habitat in tributaries like Henderson Brook.

The MEDMR annually stocks Atlantic salmon of various life stages in the Penobscot Bay SHRU to facilitate recovery of this endangered species. In recent years, Atlantic salmon parr have been stocked in the West Branch Pleasant River at the Katahdin Ironworks Road gatehouse and further downstream at Brownville Junction and Brownville. Stocking was initiated further upstream (closer to the proposed action area) because marked Atlantic salmon parr stocked lower in the drainage at Brownville and Brownville Junction were found further upstream at the Hermitage crossing (downstream of Henderson Brook). Eggs were stocked in the West Branch Pleasant above Silver Lake in the years 2013, 2016, 2017, 2018, and 2019 at an average of 266,019 eggs per year. In 2019, 359,536 eggs were stocked, the greatest number to date. In 2104 and 2015, 55,348 and 68,034 fry were stocked, respectively. The stocking site nearest to the proposed action area is within 1000 feet of the outlet of Henderson Brook. Parr were stocked at the Katahdin Ironworks Road Gatehouse in 2021, 2020, 2015, and 2013 (P. Ruksznis, Maine Department of Marine Resources, pers. comm.; 2022). Juvenile Atlantic salmon stocked in the West Branch Pleasant could move into tributaries like Henderson Brook that offer suitable rearing habitat.

During late summer each year, the MEDMR conducts electrofishing surveys to determine the presence and abundance of juvenile Atlantic salmon in areas where either restoration stocking or spawning has occurred. During these surveys, juvenile Atlantic salmon have been documented in the West Branch Pleasant River in multiple locations. In September 2020, 29 parr and 6 young-of-the-year (YOY; parr during their first year after hatching) Atlantic salmon were caught at two sampling locations downstream of Henderson Brook (site at RKM 25.85 and site at RKM 23.31). Dating back to 2005, the average electrofishing catch for a site on the West Branch Pleasant above Silver Lake is 4.3 parr and 15.1 YOY. In general, juvenile numbers have increased over time. To date, the maximum catch from any electrofishing site in this area was 56 parr in 2018 and 83 YOY in 2019. To illustrate this upward trend, average catch per unit area (CPUA) for surveys from 2011 through 2014 is 4.81, which increases to 12.98 for 2016 through 2020 (2015 data was not available for this area).

The Service's MEFWCO took two water samples from Henderson Brook (both downstream of the existing culvert) on August 19, 2021, and sent them to the University of Maine eDNA CORE Facility to test for the presence of Atlantic Salmon DNA. Both samples had more than half the replicates amplify, indicating relatively high concentration of Atlantic Salmon DNA. These eDNA results indicate that Atlantic salmon are likely present below the culvert in Henderson Brook, which is consistent with the recent stocking and spawning history in the nearby West Branch Pleasant River.

## 4.2 STATUS OF CRITICAL HABITAT IN THE ACTION AREA

The project action area is located within the Pleasant River HUC-10 watershed (0102000406), which is designated as critical habitat for Atlantic salmon. Within this watershed, perennial rivers and streams like Henderson Brook are critical habitat. The MEDMR has conducted field surveys throughout Maine to identify areas of suitable spawning and juvenile rearing habitat for Atlantic salmon. Although a portion of the West Branch Pleasant River has been field mapped, many tributaries–including Henderson Brook–have not been mapped. Based on known use of Henderson Brook by juvenile Atlantic salmon and field observations of stream habitat characteristics, the project action area contains at least some of the physical and biological features of Atlantic salmon critical habitat, particularly for juveniles.

A GIS-based model used to predict occurrence of Atlantic salmon juvenile rearing habitat in the GOM DPS predicts that 107.5 units of rearing habitat could occur within Henderson Brook (Wright et al. 2008). Within the action area, which includes the construction site around the existing culvert and 1,000 feet downstream, the model predicts about 10 units of rearing habitat or approximately nine percent of the total juvenile rearing habitat within Henderson Brook (107.5 HU). It is unlikely that there is suitable spawning habitat for Atlantic salmon in this brook due to its small size.  Henderson Brook is more likely to provide brook trout spawning habitat (P. Rukznis, Maine Department of Marine Resources, pers. comm.; 2020).

The existing culvert is likely to prohibit juvenile Atlantic salmon from accessing approximately 3.4 miles of potential rearing habitat upstream of the Katahdin Ironworks Road.  Conservation partners have already restored aquatic habitat connectivity and natural stream functions in Henderson Brook upstream of the Katahdin Ironworks Road, which has improved the condition of salmon critical habitat upstream of this project's action area.  The proposed action will allow Atlantic salmon juveniles to access rearing habitat throughout all of Henderson Brook, improving their ability to survive and grow.

## 5.0 EFFECTS OF THE ACTION

Based on our analysis of the information provided in the NPS ANST's BA, the Service concurs that the proposed project will result in unavoidable adverse effects to individual Atlantic salmon due to disturbance during construction activities.  These adverse effects will be of short-term duration and happen over a relatively small area of salmon habitat during the proposed construction activities.  Effects to critical habitat during construction will be short-term, relatively small in spatial scale, and overall insignificant.  Overall, the proposed culvert replacement project should result in long-term beneficial effects to both Atlantic salmon and their critical habitat in the project area and support salmon recovery in the West Branch Pleasant River watershed.

## 5.1 EFFECTS OF THE ACTION ON ATLANTIC SALMON

There are several components of the project that may affect individual Atlantic salmon, particularly juveniles.  Given the proposed timing of the project (instream work will occur between July 15 and September 30), the project will not have any effect on Atlantic salmon eggs, fry or smolts. As used in this section, the term juvenile specifically refers to Atlantic salmon parr (the period which follows the fry life stage).  Adults are not expected in the action area because of the relatively small size of Henderson Brook and the lack of deep holding pools in the project area.

### 5.1.1 Elevated Turbidity and Sediment Transport

When preparing for the culvert removal and bridge construction, some limited vegetation clearing will need to occur in the vicinity of Henderson Brook.  Additionally, some vegetation will be cleared or trampled with the creation of a temporary detour of the Appalachian Trail around the construction site; no trees, however, will be cut for this detour.  Use of standard erosion control best management practices (BMPs), like installation of silt fence, will minimize the effects of soil erosion and sedimentation on the brook from work adjacent to the channel, including vegetation clearing, excavation, and grading.

Installation and removal of cofferdams, used to isolate the instream work area around the existing culvert, will also result in some sediment being discharged into Henderson Brook. Use of cofferdams to isolate an instream construction site, however, is a standard conservation measure used to minimize the overall effects of instream work and associated turbidity on

Atlantic salmon. Short-term (generally two hours or less) turbidity pulses typically result from placing or removing cofferdams and from reintroducing stream flow back into the dewatered work area where exposed soils become suspended in the water column. Given the relatively course substrates present in Henderson Brook (predominant particle sizes are 3.5 to 14 inches, with the smallest particle size being very coarse sand), this will help to minimize the amount of sediment generated by the installation and removal of cofferdams and the reintroduction of stream flows to the dewatered reach.

The effects of increased suspended solids on individual salmon depend on the extent, duration, timing, and frequency of increased sediment levels at the place where it will occur (Bash et al. 2001). The effects of elevated instream turbidity on individual Atlantic salmon, which can range from behavioral responses to sub-lethal effects to potential mortality, are thoroughly explained in a previous Service BO which evaluates various types of road-stream crossing projects and are incorporated here by reference (Service 2017). These effects from increased turbidity are expected to extend up to 1,000 feet downstream of the instream work area associated with the proposed action.

Juvenile Atlantic salmon will be exposed to pulses of increased suspended sediment during installation and removal of cofferdams and when sediment is generated by dewatering and rewatering work areas, resulting in adverse behavioral and sub-lethal effects to juvenile Atlantic salmon. Juvenile Atlantic salmon may also be briefly exposed to increased turbidity prior to their evacuation from the isolated work area before it is dewatered.

The number of juvenile Atlantic salmon that are likely to be exposed to adverse effects from suspended sediment in Henderson Brook will depend on the amount of stream habitat that will be affected and the density of juvenile Atlantic salmon in this area. Although up to 1,000 feet of stream area downstream of the cofferdam location would be impacted twice by increased turbidity (i.e., once during cofferdam installation and once during cofferdam removal), we equate these two impacts to one exposure event for juvenile Atlantic salmon, even though these two impacts are likely to happen a few days apart. Given that juvenile Atlantic salmon are territorial, the fish exposed to increased turbidity during cofferdam installation are likely the same fish exposed during cofferdam removal.

We do not have data on the density of juvenile Atlantic salmon in Henderson Brook in the action area, although eDNA testing indicated relatively high concentration of Atlantic Salmon DNA. The MEDMR, however, generally conducts annual electrofishing surveys in the West Branch Pleasant River above Silver Lake, and these data do provide some juvenile density information for the general project area (detailed above in the Environmental Baseline).

Electrofishing data from the West Branch of the Pleasant River in the vicinity of Henderson Brook showed 0 to 39.09 catch per unit area (CPUA) for salmon YOY and 0 to 7.39 for salmon parr. At a survey site located approximately 1,000 feet downstream of Henderson Brook, total juvenile density was 22.6/HU in 2021, 36.1/HU in 2019, and 24.1/HU in 2017.

Since there is no salmon stocking in Henderson Brook and we have no reason to believe that salmon spawn in Henderson Brook, juveniles are likely moving into the brook from the West

Branch Pleasant River in search of favorable rearing habitat. Therefore, it is reasonable to assume that juvenile densities in Henderson Brook would be lower than those in nearby locations in the West Branch Pleasant River where stocking and spawning do occur. Given known juvenile densities nearby in the West Branch Pleasant River and the tendency for juveniles to move downstream rather than upstream, we assume a total juvenile density (both YOY and parr) of no more than 5/HU within the action area of Henderson Brook. Based on this assumed density of Atlantic salmon juveniles, we expect up to 35 juvenile Atlantic salmon[2] could be exposed to the temporary effects of elevated turbidity and sedimentation in Henderson Brook during construction.

### 5.1.1 Temporary Movement Barrier

Effects associated with a temporary movement barrier during construction would be very limited because fish passage on Henderson Brook is already blocked by the hanging culvert on the Katahdin Ironworks Road. Isolation of the instream work area with cofferdams will cause a temporary movement barrier, but any salmon that might be present in the very short distance between the culvert and the downstream coffer dam would not be able to pass upstream into the culvert anyway. When this project is complete, the culvert acting as a movement barrier will be removed and salmon will have access to the remainder of Henderson Brook upstream of the road.

### 5.1.2 Fish Handling and Relocation

Culvert removal and bridge construction will be done in isolation from stream flows through the installation of sandbag cofferdams and the use of a pump to redirect stream flows around the instream work site. Because the dewatering of a stream inside a cofferdam would have a lethal effect on any fish left inside the cofferdam, fish relocation is used as a conservation measure to minimize the harmful effects of cofferdam installation and stream dewatering. Fish relocation uses a sequence of actions to exclude and relocate fish from the instream work area associated with the cofferdams.

To minimize dewatering-related fish stranding inside the cofferdam, MEDMR and Service staff will install block nets upstream and downstream of the cofferdam locations and then capture and remove as many Atlantic salmon and other fish species as possible from the work area. Fish evacuation procedures will follow the MEDMR's electrofishing protocol (2010) to minimize the number of Atlantic salmon juveniles subject to stranding inside the cofferdams.

Capturing and handling Atlantic salmon for relocation outside of the instream work area can cause physiological stress and possibly physical injury or death. Relocating juvenile Atlantic salmon from the instream work area to another location will cause temporary effects associated with displacement, given the territorial behavior of juvenile Atlantic salmon. These effects, including the likely effects to Atlantic salmon from electrofishing, are thoroughly described in a

[2] Since the existing culvert is assumed to be a complete barrier to upstream movement of fish, only the portion of the action area downstream of the culvert is likely to be currently occupied by juvenile salmon. Based on the rearing habitat model, there are approximately 7 HUs in the action area downstream of the culvert. If we assume as many as 5 juveniles/HU, then we can expect up to 35 total juveniles (5 x 7 = 35) downstream of the culvert within the action area.

previous BO (Service 2017) and are incorporated here by reference. The fish evacuation procedures required for this project contain a variety of conservation measures designed to minimize injury and mortality of Atlantic salmon. When construction activities are finished and stream flows are returned, juveniles can re-occupy rearing habitat in Henderson Brook.

Despite precautions, some fish mortality can be expected while electrofishing. The MEDMR typically handles a few thousand juvenile Atlantic salmon each year while electrofishing. Recorded mortalities are generally about one percent or less of fish captured and are predominately YOY Atlantic salmon. This low mortality rate reflects the training and experience of the MEDMR staff and the careful adherence to an electrofishing protocol designed to avoid mortality of Atlantic salmon. Service staff have similar training and experience with electrofishing in salmon streams in Maine.

Despite best efforts at fish relocation from the instream work site, some mortality may occur if juvenile Atlantic salmon are missed or stranded in stream substrate interstices and subsequently left inside a dewatered cofferdam. More information on the stranding of juvenile fish can be found in a previous BO (Service 2017). When cofferdams are de-watered and construction activities begin (e.g., excavation of the stream substrate), mortality is expected for any fish, including Atlantic salmon, left stranded in the substrate within the footprint of the de-watered cofferdams after all fish removal efforts have been completed.

Adverse effects to Atlantic salmon juveniles will result from fish relocation activities involving capture and movement of individuals associated with cofferdam installation for the instream work area. Given that the cofferdams are estimated to be approximately 100 feet apart, we estimate that block nets placed across the stream for fish evacuation activities will be approximately 140 feet apart, leaving a stream area of approximately 2,912 square feet (140 ft reach x 20.8 ft[3]) subject to fish evacuation activities. This area is equivalent to approximately 2.7 units of juvenile habitat. Given an assumed density of Atlantic salmon juveniles of 5/HU in the action area, then we can expect up to 14 juveniles (5 x 2.7 = 13.5, rounded up to 14 juveniles) to be captured and relocated to adjacent habitat. There is an extremely low percentage of injury or mortality typically associated with electrofishing and relocation (one percent or less).

### 5.1.3 Impingement and Entrainment

Impingement and entrainment are potential risks for juvenile Atlantic salmon at the pump intake during water pumping for cofferdam dewatering and stream diversion around the instream work site. Approach velocities across the intake screen that are faster than a fish’s swimming capability can overcome fish and draw and hold them against the screen surface (i.e., impingement), resulting in suffocation or physical damage to the fish (NMFS 2011). Pump intake hoses without screens or with improper screen designs can result in fish being drawn into the pump (entrainment) and killed.

The implementation of protective measures for fish screens on pump intakes as described above (Conservation Measures, pp. 9-10) will reduce the likelihood of fish injury or mortality from

[3] A bankfull width of 20.8 ft was measured downstream of the culvert.

interactions with pumps used to divert stream flows to be very unlikely.  With application of the required procedures, effects from impingement and entrainment to juvenile Atlantic salmon are expected to be discountable.

Additionally, fish can become impinged in block nets that have been positioned to prevent fish from moving into a work area.  This could be an additional source of injury or mortality associated with construction site isolation procedures; however, block nets used in a similar manner on many projects in Maine have not resulted in any known instances of fish impingement.  Therefore, additional capture or mortality of Atlantic salmon associated with entrainment on block nets is not expected.

### 5.1.4 Water Quality (Pollutants)

Petroleum-based materials, such as diesel fuel and oil, contain polycyclic aromatic hydrocarbons (PAHs) which can enter streams from a spill or stormwater runoff and then affect Atlantic salmon individuals.  PAHs can be acutely toxic to salmonids and other aquatic organisms at high exposure levels or can cause sublethal effects at lower exposures (Albers 2003, Meador et al. 2006).  Project activities have the potential to result in releases of various pollutants that are related to general construction activities.  All in-water excavation, however, will take place inside of a cofferdam, meaning that construction equipment will not operate directly in flowing waters.

The proposed project does not allow intentional pollutant discharges of any sort in association with construction activities.  However, the use of heavy equipment in or near a waterbody increases the risk of contaminants (fuel, oil, hydraulic fluid, etc.) being accidentally released into the project site and possibly degrading habitat conditions and threatening aquatic organisms.  As a component of their erosion control plan, the contractor(s) will develop and implement a Spill Prevention, Control and Countermeasures (SPCC) Plan, designed to avoid any stream impacts from hazardous chemicals associated with construction activities, such as diesel fuel, oil, lubricants, and other hazardous materials.  The SPCC Plan includes the assurance that necessary BMPs will be on site and employed in the event of a hazardous materials release.  Careful adherence to an approved SPCC Plan, as part of an overall erosion control plan, will make it highly unlikely that Atlantic salmon will be exposed to harmful chemicals from a spill or accident.

The contractor(s) will implement the appropriate BMPs to prevent spill incidents.  All fuel and other hazardous materials will be stored on an impervious surface at least 100 feet from streams. All pumps will be maintained, refueled, and operated at a location consistent with the SPCC Plan and in a manner that avoids chemical or other hazardous materials getting into the stream.

Depending on the nature of released material, a spill event could have adverse effects to Atlantic salmon individuals.  However, the contractor will implement the specified BMPs to help prevent spill incidents and ensure that the consequences of spills are minimized. The contractor will ensure proper implementation of the SPCC Plan, greatly reducing the chance of exposure of Atlantic salmon to harmful chemicals from a spill or release. I n summary, effects to Atlantic salmon from pollutants that may enter the water from spills and equipment leaks will be minimized to insignificant and discountable levels through conservation measures such as implementation of the SPCC Plan and locating refueling and maintenance activities at least 100 feet from streams.

### 5.1.5 Recreational Fishing

In Maine some road stream crossings, particularly bridges, are a convenient place for recreational anglers to fish from. While the existing culvert crossing of Henderson Brook is unlikely to be an attractive place for angling (a perched culvert with no large pool at the outlet due to the very coarse stream substrate), it is possible that the new bridge and restored stream channel might be more attractive. However, by regulation the NPS prohibits fishing from motor road bridges (36 CFR 2.3(d)(8)), and the NPS ANST will post a sign at the new bridge notifying anglers of this prohibition. Given the prohibition on fishing from the new bridge and the relatively shallow and rocky nature of Henderson Brook adjacent to the Katahdin Ironworks Road (i.e., making it not very conducive to angling), effects to juvenile Atlantic salmon from recreational anglers targeting other species (e.g., brook trout) are very unlikely to occur or discountable.

### 5.1.6 Habitat Alteration

This section focuses on impacts to Atlantic salmon resulting from temporary and permanent habitat modifications related to in-channel fill placement and dewatering. Separately, effects to critical habitat are discussed below in section 5.2.

#### 5.1.6.1 Temporary Habitat Alteration

Temporary fill placement in the form of two sandbag cofferdams is not expected to result in permanent habitat degradation, as the affected areas in the brook will be minimized to what is necessary for construction and then restored following use. After the cofferdams are installed, the work area inside them will be dewatered, making the existing habitat temporarily unavailable to Atlantic salmon. This area of impact will be very small, since it will be limited to the dewatered section of the stream below the culvert where salmon currently have access (much less than 100 feet of stream channel). Excavation that occurs within the dewatered section of Henderson Brook will be done only to facilitate the restoration of the stream channel where the removed culvert has degraded the natural stream channel.

Based on the relatively small area affected compared to the available surrounding habitat in Henderson Brook and the fact that the habitat will be restored following construction and once again available for use by salmon and other aquatic organisms, these temporary habitat impacts will have insignificant effects on juvenile Atlantic salmon.

#### 5.1.6.2 Permanent Habitat Alteration

A small amount of permanent habitat alteration in Henderson Brook will result from the replacement of the existing culvert with a bridge. These permanent alterations will affect about 100 feet of Henderson Brook and will include 1) riprap to stabilize the stream banks and protect the new bridge abutments, 2) a series of boulder grade control weirs designed to mimic the natural stream form (i.e., step-pool morphology) and allow for upstream fish passage, and 3) additional fill of stream substrate materials to restore the natural stream bed where the culvert is removed. Restoration of the stream bed is designed to replicate the natural substrate sizes and other features characteristic of Henderson Brook.

This road stream crossing replacement project will result in net permanent improvements in stream habitat and function, including restoration of aquatic organism passage above the Katahdin Ironworks Road. Overall, this project will avoid permanent, adverse effects to Henderson Brook and instead result in long-term beneficial effects to habitat for juvenile Atlantic salmon and other aquatic organisms.

## 5.2 EFFECTS OF THE ACTION ON ATLANTIC SALMON CRITICAL HABITAT

The proposed action is located within designated critical habitat for Atlantic salmon. As discussed above, the action area is assumed to contain some rearing habitat for juvenile Atlantic salmon by providing opportunities for feeding and sheltering. Given the location of the action area relatively high in the watershed, the smaller size of the stream, and the lack of appropriate substrate, the action area does not provide Atlantic salmon spawning habitat or Atlantic salmon migration habitat for either adults or smolts. Atlantic salmon parr are expected to move downstream out of the action area before beginning the spring smolting process and their out-migration to the ocean. The proposed action is therefore expected to result in both temporary and permanent effects to Atlantic salmon critical habitat that provides sites for juvenile rearing.

The physical and biological features of juvenile rearing habitat will be temporarily affected during project construction. A small area of juvenile rearing habitat between the culvert outlet and the downstream coffer dam will be dewatered and unavailable to Atlantic salmon for sheltering or feeding during the culvert removal and bridge construction. This effect is temporary and very limited in spatial scope, however. After the cofferdams are removed and the construction site is rewatered, this habitat can then be reoccupied by juvenile Atlantic salmon. While the area inside the cofferdams is dewatered, aquatic invertebrates and very small fish not removed during fish evacuation will die and will no longer be available as prey items for juvenile Atlantic salmon. Once stream flows are returned to this area, however, we expect that aquatic organisms will quickly repopulate the stream channel and again be available as food items for juvenile Atlantic salmon.

Installation and removal of the cofferdams on the stream bed will result in some elevated turbidity within the action area (up to 1,000 feet downstream). Introduction of sediment into juvenile rearing habitat can affect important physical features of critical habitat, for instance when fine sediment fills interstitial spaces between gravels and cobbles making those spaces unavailable as shelter for juvenile Atlantic salmon. Given the limited spatial scope of the cofferdam installation and removal activities and the coarse particle sizes present in Henderson Brook (the smallest being very coarse sand), the effects of temporary elevated turbidity on juvenile rearing habitat are expected to be relatively minor and therefore insignificant.

In summary, construction activities will have temporary effects to Atlantic salmon rearing habitat. At most, these effects will only impact about nine percent of the juvenile rearing habitat that is predicted to occur within Henderson Brook; and these effects will last for a very short amount of time (minutes rather than hours) given the coarse stream substrates. Because of the limited spatial and temporal scope of these effects, all the temporary construction-related effects to critical habitat will be insignificant.

Replacement of the existing undersized and perched culvert with a clear span bridge will restore natural flows and substrate dynamics to the action area and open the upstream portion of Henderson Brook to fish passage. Approximately 100 ft of natural stream channel will be restored where the culvert is now. Temporary disturbances to the action area will allow for permanent habitat restoration of a portion of Henderson Brook.

In summary, we conclude that the culvert removal and bridge construction is not likely to adversely affect critical habitat for juvenile rearing within Henderson Brook due to the temporary nature and limited footprint of the proposed construction activities, the proposed stream channel restoration, and the restoration of upstream fish passage. The project will result in a long-term improvement to critical habitat for Atlantic salmon juveniles, most notably the restoration of access to 3.5 miles of upstream habitat.

## 5.3 CUMULATIVE EFFECTS

Cumulative effects are those "effects of future State, tribal, local, or private activities, not involving Federal activities, that are reasonably certain to occur within the action area" considered in this BO (50 CFR 402.02). The entire action area is on National Park Service land, so there will be no cumulative effects given that any action by NPS that "may affect" listed species or critical habitat would require ESA section 7 consultation. A brief discussion is given below of possible future activities on nearby private or State-owned properties.

Long-term human activity types and levels of use on the Katahdin Ironworks Road, Appalachian Trail, and surrounding are expected to remain the same as they have been thus disturbance would be unchanged in the long term. The Appalachian Trail footpath may be relocated slightly further away from Henderson Brook near the project site, which would reduce erosion from the trail into the brook. If this project is pursued by the NPS ANST, section 7 consultation would likely be required.

The land surrounding the project area is owned by the MEBPL to the east and the Appalachian Mountain Club to the west. Both landowners manage the land for conservation and recreation, and development of this land is not likely. The MEBPL's management plan for the West Branch Pleasant River Unit neighboring the proposed action area mentions consideration of expanding the Gulf Hagas parking area if use levels warrant (MEDACF 2021). This unit is under a Habitat Management Agreement with the Maine Department of Inland Fish and Wildlife (MEDIFW) which stipulates that management of public access should emphasize maintaining the remote wilderness character of the riparian corridors and that new trails will only be developed at the behest of the MEDIFW. Any expansion of the Gulf Hagas parking area is likely to have only minor effect on Atlantic salmon, Canada lynx, or northern long-eared bat.

Forestry actions on private land will likely continue to occur in the vicinity of the proposed project. Most forestry actions in Maine occur without any Federal agency involvement. Except for road-stream crossings, timber harvest and associated activities, when done in accordance with current forestry BMPs, are generally thought to have only minor effects on Atlantic salmon and their habitat.  Poorly designed road-stream crossings, however, could result in a variety of adverse effects to Atlantic salmon and their critical habitat.  It is unknown if new road-stream crossings for forestry activities are likely to be built in the vicinity of the project action area in the foreseeable future; however, new road-stream crossings are unlikely given the land use context.  No forestry actions will occur within the action area.

## 6.0 CONCLUSION

After reviewing the current status of the endangered Atlantic salmon and its designated critical habitat, the environmental baseline for the action area, the effects of the proposed action and cumulative effects, it is the Service's biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Atlantic salmon and will result in a net conservation benefit to the species.  Furthermore, the proposed action is not expected to result in the destruction or adverse modification of Atlantic salmon critical habitat.

The Service reached these conclusions because:

- A primary purpose of the proposed action is to conserve the Atlantic salmon and its critical habitat.
- The proposed action was developed in coordination with the Service and other partners to support recovery of Atlantic salmon.
- The proposed action considers, and is consistent with, the survival and recovery needs of the Atlantic salmon and the role of the action area in providing for those needs.
- The proposed action considers, and is consistent with, the recovery support function of critical habitat for the Atlantic salmon and the role of the action area in providing for that function.
- There is a proven track record for successful implementation of similar road-stream crossing replacement projects throughout the GOM DPS range, and there is a high level of certainty that the proposed action is likely to produce a beneficial impact for Atlantic salmon and its critical habitat.
- Adverse effects (including those that conform to incidental take) are likely to be small in magnitude, temporary (meaning not continuous, recurring, or chronic), short-term and geographically local.
- The amount or extent of incidental take of Atlantic salmon will be low and is not likely to have population-level impacts to this species.
- All take is limited to juvenile Atlantic salmon and will be mostly non-lethal take associated with fish evacuation from the instream work area and downstream sedimentation.
- The proposed action will not cause a permanent net loss of habitat, a net loss of habitat function, a net loss of critical habitat, or a net loss of functional value of critical habitat.

## 7.0 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 provided that such taking is in compliance with the terms and conditions of this incidental take statement (ITS).

The measures described below are nondiscretionary and must be undertaken by the NPS and the Service's MEFWCO so that they become binding conditions of any grant or authorization, as appropriate, for the exemption in section 7(o)(2) to apply. The NPS and the Service (MEFWCO) have a continuing duty to regulate the activity covered by this ITS. If the NPS and the Service (MEFWCO) (1) fail to assume and implement the terms and conditions or (2) fail to require adherence to the terms and conditions of the ITS through enforceable terms that are added to any grant or other authorization, then the protective coverage of Section 7(o)(2) may lapse. To monitor the impact of incidental take, the NPS and the Service (MEFWCO) must report the progress of the action and its impact on the species to the Service as specified in the ITS [50 CFR 402.14(i)(3)].

## 7.1 AMOUNT OR EXTENT OF TAKE ANTICIPATED

The Service anticipates that there may be both non-lethal and lethal take of juvenile Atlantic salmon because of the proposed action addressed in this BO. Incidental take caused by the adverse effects of the proposed action will include the following: 1) the short term exposure of juvenile Atlantic salmon to elevated turbidity; 2) the short-term exposure of juvenile Atlantic salmon to movement barriers; 3) the capture and relocation of juvenile Atlantic salmon during instream work area isolation and dewatering, 4) the death of juvenile Atlantic salmon as a result of capture techniques, and 5) the death of juvenile Atlantic salmon left stranded inside the dewatered construction zone. The following discussion summarizes the anticipated amount of incidental take associated with these activities, as derived from the analysis in this BO.

The anticipated take of juvenile Atlantic salmon is described in Table 1. This authorized take includes both non-lethal and lethal take of juvenile Atlantic salmon, although most of the take is expected to be non-lethal. Only fish handling and relocation, including stranding of any individuals not captured, might result in lethal harm to individual Atlantic salmon.

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's Maine Field Office should be contacted to discuss next steps. Reinitiation of section 7 consultation may be necessary, depending on the circumstances at hand.

**Table 1. Amount and type of anticipated incidental take of juvenile Atlantic salmon.**

| Stressor | Amount of Anticipated Take (Number of Individuals) | Type of Take | Take is Anticipated as a Result of |
|---|---|---|---|
| Elevated turbidity/sediment | 35 | Harm | Behavioral and sublethal effects including startle, avoidance, stress, reduction in feeding, and increased respiration |
| Fish Handling and Relocation | 14 | Capture and release, harm, and kill | Capture during fish relocation and mortality from capture (blunt force trauma) and stranding in dewatered channel |

## 7.2 REASONABLE AND PRUDENT MEASURES AND TERMS AND CONDITIONS

In the accompanying BO, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat. In order to be exempt from the prohibitions of section 9 of the Act, the NPS and the Service (MEFWCO) must comply with the following non-discretionary reasonable and prudent measures and terms and conditions and reporting/monitoring requirements

### 7.2.1 REASONABLE AND PRUDENT MEASURES

Due to the broad inclusion of CMs in the project description, the only required reasonable and prudent measure is that all CMs, as identified in this BO, must be followed during construction of the proposed project.

### 7.2.2 TERMS AND CONDITIONS

**7.2.2.1** The Service's Maine Field Office will be notified of all known Atlantic salmon mortalities within 72 hours of occurrence. A count of mortalities should be provided along with photographs of each fish, as practicable. Point of contact at the Maine Field Office is Wende Mahaney (by email at *wende_mahaney@fws.gov* or by phone at 207/944-2991). All salmon carcasses should be inconspicuously returned to Henderson Brook after documentation.

**7.2.2.2** The Federal action agencies will generate a report for submittal to the Service's Maine Field Office by December 31, 2023 (or by December 31 of the year of construction) to summarize the implementation of the proposed culvert replacement project. The report will include a summary of all incidental take, including mortalities, of Atlantic salmon. The report will summarize compliance with all CMs, making particular note of any difficulties encountered or unanticipated outcomes. The report will document and describe the completed project, including photographs.

## 8.0 REINITIATION NOTICE

This concludes formal consultation on the actions outlined in the November 9, 2022 request from the NPS. 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 BO; 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 BO; 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 activities causing such take must cease pending reinitiation.

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