DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 226

[Docket No. 0808061060–9710–02]

RIN 0648–AW77

Endangered and Threatened Species; Designation of Critical Habitat for Atlantic Salmon (Salmo salar) Gulf of Maine Distinct Population Segment

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration, Commerce.

ACTION: Final rule.

SUMMARY: We, the National Marine Fisheries Service (NMFS), issue a final rule designating critical habitat for the Atlantic salmon (*Salmo salar*) Gulf of Maine Distinct Population Segment (GOM DPS). We previously determined that naturally spawned and several hatchery populations of Atlantic salmon which constitute the GOM DPS warrant listing as endangered under the Endangered Species Act of 1973, as amended (ESA). We are required to designate critical habitat for the GOM DPS as a result of this listing. We hereby designate as critical habitat 45 specific areas occupied by Atlantic salmon at the time of listing that comprise approximately 19,571 km of perennial river, stream, and estuary habitat and 799 square km of lake habitat within the range of the GOM DPS and in which are found those physical and biological features essential to the conservation of the species. The entire occupied range of the GOM DPS in which critical habitat is designated is within the State of Maine. We exclude approximately 1,256 km of river, stream, and estuary habitat and 100 square km of lake habitat from critical habitat pursuant to section 4(b)(2) of the ESA.

DATES: This rule becomes effective July 20, 2009.

ADDRESSES: Comments and materials received, as well as supporting documentation used in the preparation of this final rule, are available for public inspection by appointment, during normal business hours, at the National Marine Fisheries Service, NMFS, Protected Resources Division, 55 Great Republic Drive, Gloucester, MA 01930–2276. The final rule, maps, and other materials relating to these designations can be found on our Web site at: *http://www.nero.noaa.gov/prot_res/altsalmon/*.

FOR FURTHER INFORMATION CONTACT: Dan Kircheis, National Marine Fisheries Service, Maine Field Station, 17 Godfrey Drive, Orono, ME 04473 at (207) 866–7320, or Marta Nammack at (301) 713–1401 ext. 180.

SUPPLEMENTARY INFORMATION:

Organization of the Final Rule:

This final rule describes the critical habitat designation for the GOM DPS of Atlantic salmon under the ESA. The pages that follow summarize the comments and information received in response to the proposed designation published on September 5, 2008 (73 FR 51747), describe any changes from the proposed designation, and detail the final designation for the GOM DPS of Atlantic salmon. To assist the reader, the content of the document is organized as follows:

I. Background and Previous Federal Action

We are responsible for determining whether a species, subspecies, or distinct population segment (DPS) of Atlantic salmon (*Salmo salar*) is threatened or endangered, and for designating critical habitat for the species, subspecies, or DPS under the ESA (16 U.S.C. 1531 *et seq.*). To qualify as a DPS, an Atlantic salmon population must be substantially reproductively isolated from other conspecific populations and represent an important component in the evolutionary legacy of the biological species.

We are also responsible for designating critical habitat for species listed under our jurisdiction. Section 3 of the ESA defines critical habitat as (1) specific areas within the geographical area occupied by the species at the time of listing, on which are found those physical or biological features that are essential to the conservation of the listed species and that may require special management considerations or protection, and (2) specific areas outside the geographical area occupied by the species at the time of listing that are essential for the conservation of a listed species. Our regulations direct us to focus on the ''primary constituent elements,'' or PCEs, in identifying these physical or biological features. Section 7(a)(2) of the ESA requires that each Federal agency, in consultation with and with the assistance of NMFS, ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of an endangered or threatened Atlantic salmon or result in the destruction or adverse modification of critical habitat. Section 4 of the ESA requires us to consider the economic impacts, impacts on national security, and other relevant impacts of specifying any particular area as critical habitat.

NMFS and the U.S. Fish and Wildlife Service (USFWS; collectively ''the Services'') issued a final rule listing the GOM DPS of Atlantic salmon as endangered on November 17, 2000 (65 FR 69459). The GOM DPS was defined in the 2000 rule as all naturally reproducing wild populations and those river-specific hatchery populations of Atlantic salmon, having historical river-specific characteristics found north of and including tributaries of the lower Kennebec River to, but not including, the mouth of the St. Croix River at the U.S.-Canada border and the Penobscot

River above the site of the former Bangor Dam.

In September 2006, a new Status Review for Atlantic salmon in the United States (Fay *et al.*, 2006) was made available to the public (*http://www.nmfs.noaa.gov/pr/pdfs/statusreviews/atlanticsalmon.pdf*). The 2006 Status Review identified the GOM DPS of Atlantic salmon as being comprised of all anadromous Atlantic salmon whose freshwater range occurs in the watersheds of the Androscoggin River northward along the Maine coast to the Dennys River, including all associated conservation hatchery populations used to supplement natural populations; currently, such populations are maintained at Green Lake National Fish Hatchery (GLNFH) and Craig Brook National Fish Hatchery (CBNFH). In September 2008 a proposed rule was published proposing to list the GOM DPS of Atlantic salmon as defined in the 2006 Status Review as endangered (73 FR 51415; September 3, 2008). In response to public comments received on the proposed listing rule, and in review of the critical habitat proposed rule, also published in September 2008 (73 FR 51747; September 5, 2008), the Gulf of Maine DPS was re-defined to exclude those areas that were outside the historic range of the species. The final rule published by NMFS and the USFWS in today's **Federal Register** (see Endangered and Threatened Species; Determination of Endangered Status for the Gulf of Maine Distinct Population Segment of Atlantic Salmon) defines the GOM DPS as all anadromous Atlantic salmon whose freshwater range occurs in the watersheds from the Androscoggin River northward along the Maine coast to the Dennys River, and wherever these fish occur in the estuarine and marine environment. The following impassable falls delimit the upstream extent of the freshwater range: Rumford Falls in the town of Rumford on the Androscoggin River; Snow Falls in the town of West Paris on the Little Androscoggin River; Grand Falls in Township 3 Range 4 BKP WKR, on the Dead River in the Kennebec Basin; the un-named falls (impounded by Indian Pond Dam) immediately above the Kennebec River Gorge in the town of Indian Stream Township on the Kennebec River; Big Niagara Falls on Nesowadnehunk Stream in Township 3 Range 10 WELS in the Penobscot Basin; Grand Pitch on Webster Brook in Trout Brook Township in the Penobscot Basin; and Grand Falls on the Passadumkeag River in Grand Falls Township in the Penobscot Basin. The marine range of the GOM DPS extends from the Gulf of Maine, throughout the Northwest Atlantic Ocean, to the coast of Greenland. Included are all associated conservation hatchery populations used to supplement these natural populations; currently, such conservation hatchery populations are maintained at GLNFH and CBNFH. Excluded are landlocked salmon and those salmon raised in commercial hatcheries for aquaculture. The GOM DPS as defined in the final rule has been listed as endangered under the ESA.

The most substantial difference between the 2000 GOM DPS and the GOM DPS described in the final rule published by NMFS and the USFWS in today's **Federal Register** (see Endangered and Threatened Species; Determination of Endangered Status for the Gulf of Maine Distinct Population Segment of Atlantic Salmon) is the inclusion of the Androscoggin, Kennebec, and Penobscot River basins.

The timeline for completing the critical habitat designation described in this final rule was established pursuant to litigation between NMFS and the Center for Biological Diversity and the Conservation Law Foundation. Upon reaching a settlement agreement, NMFS has agreed to publish a final rule designating critical habitat for Atlantic salmon no later than June 1, 2009.

II. Summary of Comments and Responses

As described in agency regulations at 50 CFR 424.16(c)(1), we requested that all interested parties submit written comments on the proposed critical habitat designation. We also contacted the appropriate Federal and State agencies, scientific organizations, and other interested parties and invited them to comment on the proposed rule. To facilitate public participation, we made the proposed rule available via the Internet as soon as the rule was published and accepted comments by standard mail, fax, e-mail or through *http://www.regulations.gov*. In addition we held two public hearings: One in Augusta, ME, on November 5, 2008; and one in Brewer, ME, on November 6, 2008. During this time 37 parties or individuals submitted written comments on the critical habitat proposed rule. These comments were grouped into three categories as they related to the 3 primary sections of the Critical habitat designation: Biological Valuation; Economic Analysis; and 4(b)(2) exclusion analysis. A fourth category is included to address general comments and an overview of how comments were handled that were not directly related to the critical habitat designation. In section III we review comments and additional information that resulted in changes to the critical habitat rule and supporting documents.

Biological Valuation

Comment 1: One commenter stated that assuming the standard habitat needs of salmon (240 eggs per unit, 7,200 eggs per female, 1:1 sex ratio) and using the calculations described in the document, the historic run size of 150,000 fish would have required 2,250,000 units of habitat (75,000 females (assuming 1:1 sex ratio) × 7,200 eggs per female/240 eggs per unit of habitat); seven times the amount of habitat in the entire Penobscot Salmon Habitat Recovery Unit (SHRU).

Response: Conservation Spawning Escapement or CSE is often used as a tool to describe the minimum number of spawners needed to provide sufficient quantities of eggs needed to fully seed the available habitat. The estimation of CSE is not meant to predict run sizes. The minimum number of eggs to fully seed the habitat is 240 eggs per unit of habitat where one unit of habitat is equivalent to 100 meters squared. The equation described by the commenter: (# of females × 7,200 eggs per female/ 240 eggs per unit of habitat = units of habitat) incorporates the same values used to estimate the minimum spawner requirement or CSE for a river in both national and international forums. CSE estimates do not take into account that, in healthy robust populations, animals are often produced in numbers greater than what is needed to fully seed the habitat, and, therefore, only those animals that are most fit for the given environment successfully contribute to the next generation. This is why historic estimates of over 100,000 adults in the Penobscot River far exceed the minimum spawning requirement or CSE for the Penobscot of 6,838 adult spawners. Despite the estimations that the Penobscot River had run sizes in the 10's of thousands or even 100's of thousands, only a fraction of the entire run would be expected to actually contribute to the next generation due to natural selection factors (*i.e.*, not all adults will successfully spawn, and, of those that do, not all of the juveniles will successfully reach maturity). We refer to this historic estimate provided by Atkins and Foster (1868) as a reference point to what the run potential for the Penobscot SHRU could be; not the minimum number of spawners that would be needed to fully seed the habitat. Furthermore, the historic estimates of 150,000 adult returns (males and females) was not a factor in determining the run size of 2,000 adult spawners (1,000 males and 1,000 females assuming a 1:1 sex ratio) used as a recovery goal to project critical habitat for each SHRU.

Comment 2: One commenter stated that the 240 eggs per unit was derived as a way to estimate the number of spawners needed to populate salmon habitat with juveniles to produce 2, 3, and 4 year old smolts, and was never intended to be used to calculate the amount of habitat required by a given number of spawners. The commenter stated that it was their belief that using the 240 eggs per unit of habitat to predict habitat is an incorrect application of the work of Elson (1975) and Symons and Heland (1978), and is very likely to greatly overestimate the amount of habitat required to achieve recovery.

Response: As described in the response to comment 1, the 240 eggs per unit is a target egg deposition needed to fully seed a river (Elson, 1975) and is the same number that is used to predict CSE of a river. The CSE is most often used to establish a conservation goal for a river based on the amount of habitat that is available to the species and widely used to describe the status of individual Atlantic salmon populations. Absent better information we believe that the equation used to estimate CSE can be applied inversely (# of females × 7,200 eggs per female/240 eggs per unit = units of habitat) to estimate habitat needed to support the offspring from a pre-determined number of females. We do not believe that the estimates we provide are an over estimation, as the 240 eggs per unit were intended to take into account natural selection factors that would limit survival of the species. In some site specific cases, there are likely to be river reaches that could support far more than 240 eggs per unit and conversely, there are likely some reaches that can support fewer than 240 eggs per unit.

Comment 3: Some commenters supported the designation of critical areas for the protection of Atlantic salmon in the Gulf of Maine, but felt that this designation did not extend far enough. The commenters stated that a critical habitat designation must include all habitat within the historical range of the GOM DPS of Atlantic salmon. Some commenters believed that the proposed critical habitat designation arbitrarily excluded most of the historic, suitable Atlantic salmon habitat and should include more specific areas in the Kennebec River, the Androscoggin River main stem and its tributaries all the way to Rumford, the entire West Branch of the Penobscot and its tributaries, and the Passadumkeag River. Some commenters also stated that critical habitat designation should include the Presumpscot River and the Sebago Lake watershed. Alternatively, some commenters were opposed to the proposed critical habitat designation on the Androscoggin River.

Response: Sections 3(5)(A)(i) and (ii) of the ESA define critical habitat for a threatened or endangered species as the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of Section 4 of the ESA, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and specific areas outside of the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the ESA, upon a determination by the Secretary that such areas are essential for the conservation of the species. We determined in the Biological Valuation process that no additional areas outside of the geographical area occupied by the species at the time it is listed were essential for the conservation of the species because sufficient quantities of habitat are available to achieve conservation in the currently occupied range (NMFS, 2009a). Therefore, we concluded that unoccupied areas, including those specific areas within the Kennebec River above the Sandy River, the Androscoggin River above Lewiston Falls, and the entire West Branch of the Penobscot, did not qualify for critical habitat designation.

The Presumpcot River and Sebago Lake watershed are not included in the geographic range of the GOM DPS, and therefore are not eligible for designation as critical under section 3(5)(A) of the ESA.

Comment 4: Several commenters felt that our review of habitat requirements focused on activities or conditions that may affect salmon habitat but did not focus on activities that have impacted habitat. Additionally, commenters stated concerns with our identification of activities that may affect primary constituent elements and therefore may require special management consideration. Commenters specifically stated concerns with the following three statements: (1) The most direct effect of logging on stream temperature is the reduction in shade provided by riparian vegetation; (2) agricultural practices influence all specific areas proposed for designation and negatively impact PCE sites for spawning and rearing and migration; and (3) timber harvesting and preparation of soil for forestry practices can decrease large woody debris as well as increase soil erosion.

Response: We do not state explicitly that any activities are negatively impacting Atlantic salmon habitat, but rather we list activities that may negatively impact Atlantic salmon habitat. Section 4(b)(8) of the ESA states that in general we * * * ''are to include a brief description and evaluation of those activities (whether public or private) which, in the opinion of the Secretary, if undertaken, may adversely modify such habitat, or may be affected by such designation.'' The word ''may'' gives us the discretion to identify activities that are currently affecting critical habitat as well as activities that have the potential to affect critical habitat. In our description of activities and the types of effects that the activities have on critical habitat, we state that the activities may affect critical habitat recognizing that, at times, the activity can occur and have no affect on critical habitat, while in other circumstances the activity may have an affect on critical habitat. Activities that may affect critical habitat and are carried out, funded, or authorized by a Federal agency, will require an ESA section 7 consultation. In this rule, we identify activities and how they may affect critical habitat; a more detailed description of activities that may affect salmon habitat is available in our supporting document: Habitat requirements and management considerations for Atlantic salmon (*Salmo salar*) in the Gulf of Maine Distinct Population Segment (GOM DPS).

Comment 5: One commenter stated that based on the 500 fish criterion, the Penobscot SHRU is certainly not in any danger of extinction.

Response: In the recovery criteria we state that in order for the DPS to be considered recovered, all three SHRUs must meet or exceed the criteria that we have established: (1) The adult spawner population of each SHRU must be 500 or greater in an effort to maintain sufficient genetic variability within the population for long-term persistence. This is to be determined or estimated through adults observed at trapping facilities or redd counts; (2) The GOM DPS must demonstrate self-sustaining persistence where each SHRU has less than a 50 percent probability of falling below 500 adult spawners in the next 15 years based on population viability analysis (PVA) projections (NMFS, 2009, appendix A). The 50 percent assurance threshold satisfies the criterion that the population is ''not likely'' to become an endangered species, while 15 years represents the ''foreseeable future'' for which we have determined that we can make reasonable projections based on past demographic data available to us; (3) The entire GOM DPS must demonstrate consistent positive population growth for at least 2 generations (10 years) before the decision to delist is made. Ten years of pre-decision data that reflect positive population trends provide some assurance that recent population increases are not happenstance but more likely a reflection of sustainable positive population growth; (4) A recovered GOM DPS must represent the natural population (*i.e.*, adult returns must originate from natural reproduction that has occurred in the wild); hatchery product cannot be counted towards recovery because a population reliant upon hatchery product for sustainability is indicative of a population that continues to be at risk; (5) In order to delist the GOM DPS, the threats identified at the time of listing must be addressed through regulatory or any other means. These threats are identified in the five factors specified in section 4(a)(1) of the ESA as described in the 2006 Status Review (Fay *et al.*, 2006). Though the Penobscot River has consistently retained a census population of over 500 adult spawners, for the period between 1997 to 2006 approximately 9.6 percent of the Penobscot run resulted from wild spawning or fry stocked fish with the greatest wild origin adult return recorded in 1997 estimated at 160 adults (USASAC, 2007). Due to the low numbers of wild origin adult returns, the entire GOM DPS, including the Penobscot, fails to meet the objectives of recovery on the one principle point that none of the SHRUs have a wild spawning population greater than 500 adult spawners.

Comment 6: One commenter agreed with the analysis of choosing 500 adult spawners (both male and female) for an effective population size, and 2,000 spawners as a number that can weather downturns in survival as reasonable estimates for the large rivers such as those in the Merrymeeting Bay and Penobscot SHRUs (73 FR 51747; September 5, 2008, 51760–51761), but did not agree that these are appropriate numbers for the Downeast Coastal SHRU. The commenter urged us to consider reducing the numbers required for an effective population size for the Downeast Coastal SHRU to be more representative of these smaller rivers, smaller habitat, and historically far smaller salmon numbers than the larger rivers that make up the two other SHRUs.

Response: We believe that each of the three SHRUs, including the Downeast Coastal SHRU, is easily capable of supporting an effective population of 500 adult spawners. Furthermore, we believe using the criterion that each SHRU must have enough habitat to support the offspring of 2,000 adult spawners (See ''*Specific areas outside the geographical area occupied by the species . . . essential to the conservation of the species'' section* of this document) as a means of buffering against downturns in survival is also very attainable and not unreasonable for any of the three SHRUs. In the biological valuation we estimate that there are approximately 61,400 units of historical spawning and rearing habitat in the Downeast Coastal SHRU. Using the methods described by Elson (1975) to establish a minimum spawning requirement, otherwise known as the CSE, for 61,400 units of habitat, an estimated 4,094 adult spawners is needed to fully seed the Downeast Coastal SHRU (61,400 units / 7,200 eggs per female × 240 eggs per unit needed to fully seed the habitat = 2,047 females or 4,094 adult spawners assuming 1:1 sex ratio). We chose 500 adult spawners as the minimum effective population size not in respect to the size of the area, but rather in respect to the number of fish that we believe is the minimum number needed to retain sufficient genetic diversity within a SHRU. This is the case for all three SHRUs.

Comment 7: One commenter stated that recovery criteria should not be set that cannot be met. Based on the Services' calculations, the Downeast SHRU does not have enough functional habitat to meet recovery criteria.

Response: There are approximately 61,400 units of habitat in the Downeast Coastal SHRU which are considered to be equivalent to approximately 29,111 functional units. The reduced functional value of habitat in the Downeast SHRU is based on a reduction of habitat quality or the presence of dams or a combination of both as described in the biological valuation (NMFS, 2009). This means that the occupied areas in the Downeast Coastal SHRU are functioning at approximately 47 percent of their potential. We do recognize that not all Atlantic salmon habitat may have functioned historically at its fullest potential due to natural factors. In Downeast Maine, habitat degradation from roads and road crossings, dams, historic log drives, and introduction of non-indigenous species are all factors that have been identified as factors that reduce the functional value of habitat (NRC, 2004; Fay *et al.*, 2006). Improvements in habitat quality can increase the functional value of habitat for the Downeast SHRU (*e.g.*, Project SHARE's ongoing efforts that enhance fish passage and habitat quality by improving or removing bridges, culverts, and roads adjacent to or crossing streams). Given improvements to degraded habitat in the occupied areas, functional habitat quantities in the Downeast SHRU would be sufficient to meet recovery goals.

Comment 8: One commenter expressed difficulty in understanding how we determined fractions of dams for HUC 10s.

Response: Dams were discounted based on their location within a HUC 10 watershed and the degree to which it was estimated they would impede downstream migration of smolts. Dams with turbines were estimated to reduce the functional capacity habitat by 15 percent based on the findings of several studies (GNP, 1995; GNP, 1997; Holbrook, 2007; Shepard, 1991; Spicer *et al.*, 1995). Mainstem dams without turbines are not expected to affect smolts in the same way as dams with turbines, but can result in direct or indirect mortality from delays in migration and by increased predation from predators that congregate around dams. Therefore, dams without turbines were estimated to reduce the functional capacity of habitat units by 7.5 percent (one half of 15 percent). Dams located at roughly the midpoint of habitat within a HUC 10 watershed were estimated to affect passage of roughly half the fish in the HUC 10 watershed (*e.g.*, located half way up the HUC 10 watershed) and therefore were discounted accordingly (*e.g.*, 7.5 percent for dams with turbines).

Comment 9: A commenter stated that we were unclear as to why dams were treated differently than other factors that influence survival of salmon. The commenter stated that dam mortality is applied using a quantitative approach while all other factors are applied using an index number. It would therefore take approximately seven dams to have an equal effect as a quality rating of 1 (*e.g.*, approximately 33 percent). This seems to greatly underestimate the relative effects of dams compared to other factors (or vice-versa).

Response: Habitat quality scores address localized impacts and, therefore, only influence the functional habitat units within a HUC 10 for which the habitat quality score is assigned. Dams were figured into our calculations differently than habitat quality scores because they affect not only the HUC 10 in which they are present, but also every

HUC 10 upstream of their location. Depending on the geographic location of the dam in regards to habitat, a dam may influence a much larger quantity of habitat than an individual habitat quality score.

Comment 10: A commenter stated that some habitat scores within the Penobscot SHRU were underestimated because the Penobscot River Restoration Project was not included in the critical habitat designation.

Response: We did not formulate habitat estimates that included the Penobscot River Restoration Project because it has not been completed at this point and there is not certainty that the project will be completed because neither the permitting nor funding has been fully secured.

Comment 11: One commenter stated that the HUC 10 scale is too coarse. The HUC 12 scale would be better suited to identifying critical habitat.

Response: We considered analyzing at the HUC 12 scale in an attempt to gain higher resolution for critical habitat designation, but we determined that we had insufficient information to evaluate the PCEs at the HUC 12 scale for the entire GOM DPS. In order to provide fair representation across the GOM DPS, we determined that it would not be appropriate to evaluate some areas at the HUC 10 scale and some areas at the HUC 12 scale.

Comment 12: One commenter stated that the habitat amounts in some rivers were suspect. For example, the Dennys has 1,717 units compared to the Pleasant that is shown to have 3,025 units of habitat. Field habitat surveys indicate that the Dennys has approximately twice the number of habitat units as the Pleasant River. Some differences are valid due to un-surveyed small streams; however, the gross differences are surprising and need to be assessed.

Response: In our evaluation, we relied on a GIS based habitat prediction model to estimate habitat for the entire GOM DPS described in Appendix C of the Biological Valuation. Even though in some areas we have fairly comprehensive field surveys of habitat, most of the DPS range does not have this level of information. In constructing the model, the outputs were cross referenced to existing habitat surveys and were determined to be roughly 75 percent accurate at the reach level. As the commenter stated, the field surveys often only take into account mainstem habitat and major tributaries and do not take into account minor tributaries, while the GIS based model does. In the Pleasant River, Western Little River, Taylor Brook and a significant portion of Eastern Little River contain fairly significant amounts of habitat, but are not included in the field survey, and, therefore, may account for some of the discrepancy between the two survey methods. Over time as more information becomes available, we will be able to increase the accuracy of this model, but for now this is the best available information.

Comment 13: One commenter stated that the Nezinscot River HUC 10 watershed was assigned a final biological value of ''3'' even though the Nezinscot is a destination and not a migratory corridor, and another commenter stated that we designated the Little Androscoggin River which is not occupied but arbitrarily did not include any other unoccupied, but historically occupied, watersheds in either the Androscoggin Basin or the Kennebec Basin.

Response: The Nezinscot River HUC 10 watershed includes the mainstem Androscoggin River between the Little Androscoggin River HUC 10 and the Androscoggin River at Riley Dam and therefore is an important migratory corridor.

The Little Androscoggin River HUC 10 watershed does not actually include the Little Androscoggin River. This particular HUC 10 watershed includes only the Androscoggin River and its tributaries from the confluence with the Kennebec up to, but not including, the Little Androscoggin River. These comments reflect confusion expressed by many commenters about the names of HUC 10s as they relate to the location of the HUC 10. In section III of this rule, we describe how we have attempted to alleviate this confusion.

Comment 14: A commenter stated that historically inaccessible habitat should be removed from critical habitat.

Response: No specific areas in the range of the GOM DPS where the entire specific area was historically inaccessible were proposed as critical habitat. However, in some cases there may be small stream segments within a specific area identified as occupied that historically were, and still may be, inaccessible. We are unable to specifically identify the stream segments where critical habitat is proposed that may have been historically inaccessible because of insufficient information on where these barriers exist and whether they are full barriers to migration or partial barriers to migration. As activities occur in these areas, the section 7 consultation process will allow us to further evaluate stream segments that may have been historically inaccessible, and a determination of ''effect'' on the habitat will be made accordingly. If the activity is determined to be outside the historic range of the species, and the activity is not believed to affect critical habitat downstream of the migration barrier, then a determination of ''no effect'' or ''not likely to affect'' critical habitat may be made.

Comment 15: A commenter stated that the biological value score of the lower river migration corridors should not be based on the biological value scores of watersheds outside the currently occupied range.

Response: We discussed assigning biological values using two approaches: assigning scores based on the value of habitat only within the currently occupied range or assigning biological value based on the historic range of the species within the GOM DPS. We concluded that biological value scores should be assigned to HUC 10 watersheds based on the historic range of the species regardless of the presence of dams because areas with dams should not be under valued in terms of their relative importance to Atlantic salmon recovery. Hence, when evaluating the biological value of habitat, we asked biologists not to consider dams as part of their evaluation, but they were to score areas as ''0'' if they believed the area to be historically inaccessible due to natural barriers.

Comment 16: A commenter stated that the SHRU does not function as a true population but rather as a collection of independent populations, stating that this is evident by the genetic information presented in studies by King *et al.* (2000, 2001) and Spidle *et al.* (2001, 2003).

Response: The studies by King and Spidle were referred to extensively in our analysis of DPS structure within the Gulf of Maine as well as the review provided by the NRC (2003). In each of these studies, the authors do not imply that there is more than one independent population within the Gulf of Maine DPS. Spidle *et al.* (2003) and King *et al.* (2001) do describe Maine populations as independent from other North American populations and may reflect a limited number of metapopulations (a spatially separated group of populations of the same species that interact at some level). The National Research Council (NRC; 2004) does state that Maine rivers appear to reflect a metapopulation structure whereby the GOM DPS represents ''a set of local breeding populations connected by exchange of some individuals''. The NRC, however, avoids referring to these populations as independent populations. We discussed this issue with Tim King (personal communication, December 9, 2008), and he concurred that he was not aware of substantive information that would suggest that there is a collection of independent populations within the GOM DPS, and he agreed with NRC's interpretation that these populations reflect meta-population structure. McElhany *et al.* (2000) describes independent populations quite clearly as ''any collection of one or more local breeding units whose population dynamics or extinction risk over a 100-year time period is not substantially altered by exchanges of individuals with other populations.'' He goes on to state that independent populations are often smaller than the Evolutionarily Significant Unit (ESU; similar to the scale to a DPS) and more likely to inhabit a geographic range on the scale of an entire river basin or major sub-basin. In the Gulf of Maine DPS there are four HUC 6 river basins which are the Penobscot, Kennebec, Androscoggin, and the Downeast Coastal Basin. Though we recognize that the genetic evidence presented by King and Spidle clearly indicates populations with strong river specificity, we do not believe that there is compelling evidence to determine the presence of an independent population structure in the GOM DPS whereby an independent population is a population whose extinction risk over a 100-year time period is not substantially altered by exchanges of individuals with other populations.

Comment 17: A commenter stated that assigning a single population criterion of an effective population size (Ne) of 500 adult spawners (male and female) for each SHRU is not appropriate because each SHRU does not function as a true population but rather a collection of independent populations.

Response: The SHRUs are established as a geographic framework for recovery. We did not use effective population size as a criterion for recovery. Rather, we use the breeding population size in conjunction with other criteria because of the inherent difficulties of calculating effective population size for natural populations, and the further complication of having a group of local breeding populations in which there is limited straying among them.

We believe that assigning a single population criterion for an entire SHRU is more appropriate than trying to allocate population sizes on a per river basis. Assigning population values at the SHRU level allows flexibility in recovery such that recovery can take place anywhere within the SHRU as long as all of the criteria that we have established are met. Therefore, a recovered population could be spread out among multiple rivers within the SHRU or all in one river. Either scenario would allow for a recovery determination as long as all the criteria are met for delisting the DPS. If we assigned specific values or goals for specific rivers, low populations in one river could conceivably delay removing the DPS from the list.

In contrast, we do not believe that assigning population criteria to the entire DPS is sufficient enough to allow for recovery to occur. Assigning a population criterion without reference to geographic distribution could allow for recovery to occur in one river for the entire DPS. Recovery in one river could increase the population's vulnerability to losses in genetic diversity as the population would be exposed to less habitat diversity. Recovery in one river could also increase the population's vulnerability to geographic stochasticity (*e.g.*, a catastrophic event such as a drought or flood that could severely impact the population) and demographic stochasticity (*e.g.*, a significant decline in a population where recovery may require some straying from nearby populations to increase the population size or to increase genetic diversity to prevent inbreeding depression) (see NMFS, 2009, appendix A).

Recovery criteria were developed to aid in designating critical habitat (NMFS, 2009, appendix A), though final recovery criteria will be more fully developed as part of the recovery planning process following the final listing.

Comment 18: A commenter stated that many extant populations in Maine have not regularly achieved Ne > 500 nor Nb (breeding population) > than 500 over the last 100 years or more, and clearly many extant populations would have been unlikely to ever exceed the 1,000–2,000 fish level that may be needed to achieve delisting under the proposed criteria.

Response: We agree that many extant breeding populations may not have exceeded 1,000–2,000 spawners historically, but we do believe that 1,000–2,000 spawners within a SHRU is a realistic goal given the number of breeding populations within a SHRU. Even though we have little population data that pre-dates dam construction on any of the rivers in Maine, Atkins' assessments of populations in both the Kennebec and Penobscot (estimates range between 100,000 and 200,000 adult spawners annually for the Penobscot and Kennebec) (Foster and Atkins, 1869) are reasonable estimates given that these were based on harvest estimates. We also avoid stating that only extant populations within the SHRUs can be used to recover the SHRUs, understanding that, given current low abundances, especially in the Merrymeeting Bay SHRU, common garden experiments that use a mixed stock of fish from populations outside the SHRU may be the most appropriate means to re-establish populations. This concept fits well with the metapopulation paradigm, where limited straying does occur between populations, and in fact is necessary in supporting genetic diversity as well as re-colonization of populations that have been extirpated or face near extirpation. We do state however, that in most circumstances it would be appropriate, given metapopulation dynamics, to use nearby or proximate populations as a source of fish for re-establishing depleted stocks, as these fish are most likely to retain the genetic and physical characteristics most suitable for re-establishing the targeted river.

Comment 19: A commenter felt that the PVA simulation used to project habitat needed to support a recovered population seems overly pessimistic since it uses return rates from 1991–2006 to model a 50-year time horizon. The commenter suggested that it would be more realistic to use a longer time series of return rates to better reflect the types of variability likely to be seen over 50 years.

Response: In Appendix B of the Biological Valuation, an example is given of the PVA model and how it is used to project extinction risks using a time horizon of 50 years. For the actual calculations, the PVA was used in conjunction with the DRAFT Recovery Criteria to estimate how many spawners would be needed in each SHRU to withstand a period of low marine survival as experienced between the years of 1991 to 2006. The output of the model was then used in the critical habitat analysis to determine how much habitat in each SHRU would be needed to support a population capable of withstanding the period of low marine survival as experienced between the years of 1991 and 2006. This period of reference was used to reflect what we have seen as a worst case scenario. The outcome of the model revealed that 2,000 adult spawners would be needed in each SHRU in order to ensure that the population of each SHRU is ''not likely'' (<50 percent) to fall below 500 adult spawners in the ''foreseeable future'' (15 years or 3 generations). This particular time frame was used because our goal was to determine how much habitat we would need to support a population that could withstand another period of low marine survival such as experienced during the time period between 1991 and 2006.

Comment 20: One commenter stated that while the concept of effective population size (Ne) of 500 adult spawners is established in the literature, the decision to use a census size of 500 adult spawners as a minimum does not seem defensible.

Response: We recognize the difference between effective population size (the number of individuals in a population who contribute offspring to the next generation) and census population size (the actual population, in this case the actual number of adult spawners) and acknowledge the difficulties in calculating the effective population size for Atlantic salmon throughout the range of the Gulf of Maine DPS. In most circumstances though, the effective population size of a species is much smaller than the actual census population size, given that not all breeders are likely to contribute to the next generation of breeders (*e.g.*, a census population of 1,000 individuals may only have 800 individuals that are effective breeders) (Allendorf and Luikart, 2007). However, for Atlantic salmon where the breeding population consists of multiple generations, including parr, 1 sea winter, 2 sea winter, and multi-sea winter spawners, calculating the effective population size relative to the census population size is far more difficult than if all individuals were to reach maturity at the same age. Furthermore, the ratio of effective population size to census population size of adult spawner may be much closer to one for populations with multiple generations (including parr) participating in spawning activities than for populations that all mature at the same age.

Genetic data is one means of calculating the effective population size of natural populations, though extensive genetic data from all the breeding populations across the DPS would need to be gathered to accurately make these calculations. In this case, we make an assumption that the census population size is equal to the effective population size, and assume that all returning adults will be effective spawners. The census population size of adult returns determined through redd counts or adult trap catch is what the State of Maine and the Federal agencies have principally relied upon as a gauge to describe population health of Atlantic salmon in Maine and elsewhere throughout the United States (USASAC 2007), and, therefore, we believe that using this same metric to calculate recovery is reasonable. For lack of better information, we believe that a census population size of 500 fish with the added criterion identified in the recovery criteria is a very reasonable goal and adequate enough to maintain within population spatial structure and sufficient genetic diversity within each of the three SHRUs.

Comment 21: One commenter stated that the GIS-based Atlantic salmon model promises to be a powerful tool for making fisheries management decisions and directing habitat restoration or protections. The commenter went on to state though that several improvements to this model and data set could be made, including: use a digital elevation model to estimate drainage areas in the smaller basins; investigate the discrepancies and identify variables that appear to underestimate stream widths and, therefore, appear to underestimate salmon habitat in some reaches; validate the GIS model with existing field habitat surveys; check the GIS model for missing line segments; and check the model to exclude areas above known, impassible natural barriers.

Response: The GIS based habitat prediction model development was expedited for the purpose of designating critical habitat. We do recognize that there are many attributes that could improve the output of the model. These improvements could not be completed in the time available for critical habitat designation given the schedule for publishing the final critical habitat designation outlined in the settlement agreement negotiated in the Conservation Law Foundation and Center for Biological Diversity lawsuit. Regardless, the model output conservatively predicts the presence of habitat to near 75 percent accuracy and, as the commenter indicates, the model slightly underestimates habitat because of some underestimation of stream widths. We feel that the 75 percent accuracy provides us with the best available information at this time and is sufficient to designate critical habitat for Atlantic salmon at the HUC 10 level (NMFS, 2009, Appendix C).

Comment 22: One commenter stated that factors outside of forestry and land management appear to be the major limiting factors to northern Atlantic salmon populations and stated that climate change may be having an even larger effect on the species by changing runoff timing, raising stream temperatures, and changing the timing of salmon runs. Critical habitat designation does not address these issues and instead places greater emphasis on secondary or historic practices that are having at most a minor impact on the species.

Response: The statutory language of the ESA states that we shall identify and evaluate those activities (whether private or public) which, in the opinion of the Secretary, if undertaken, may adversely modify such habitat, or may be affected by such designation.

Climate change in itself is not an activity, but rather a term that describes the cumulative effects of many activities on the environment. Even though Atlantic salmon managers and scientists are concerned about the potential impacts of climate change on Atlantic salmon, at this point we have very little evidence on the effects that climate change has had or may have on Atlantic salmon in the GOM DPS. Furthermore, we are unable to support the inclusion of the activities that contribute to climate change due to a lack of scientific evidence that links the impact of a specific activity that contributes to climate change to an adverse modification of the physical and biological features essential to the conservation of the GOM DPS.

We also do not believe that we placed greater emphasis on secondary or historic practices that are having only minor impacts on the species. In our assessment, we focused on those activities that may affect critical habitat. Most notably, dams represent one activity that we have identified as having an effect on critical habitat. The NRC report (2004) concluded that ''the greatest impediment to the increase of salmon populations in Maine is the obstruction of their passage up and down streams and degradation of their habitat caused by dams.'' The importance of dams in limiting Atlantic salmon recovery is further elaborated in Fay *et al.* (2006). In conclusion, we believe that we are focusing our efforts on activities that have the potential to impact salmon habitat, as supported by observation and scientific data.

Economic Analysis

Comment 23: Several commenters stated that the economic analysis fails to address the potential cost of lost generation due to the diversion of flows for fishway operation. While it may be difficult to predict the costs associated with the potential for changes in minimum flows and similar operation changes, one commenter argued that the loss in generation value due to fishway flows can and should be quantified in the economic analysis. For example, a number of commenters assert that the Services' own ''rule of thumb'' is that they may recommend licensees divert approximately three to four percent of the turbine hydraulic capacity for use as fish passage flows. The commenters further assert that this equates directly to a loss of electric generation at these facilities, thereby increasing costs born to hydro-electric operators.

Response: Section 3.4.2 of the draft economic analysis describes qualitatively and quantitatively potential impacts associated with operational changes. This section explains that, absent information regarding how NMFS may regulate flows at specific dam sites following a critical habitat designation, impacts associated with potential operational changes are not included in the total estimated impacts presented in the report. To provide context on the potential magnitude of operational impacts, the analysis considers a hypothetical scenario in which all hydropower operations within the study area are precluded from generating power during the month of May (peak season for downstream smolt migration). According to this scenario, energy costs could be expected to increase by up to $11.3 million.

The final economic analysis includes in its impact estimates a scenario incorporating a three to four percent loss of electric generation at the projects for which fish passage costs are estimated. The analysis also incorporates a discussion on the uncertainties associated with these impacts.

Comment 24: One commenter stated that the economic analysis needs to consider additional costs associated with fish passage facilities including: operational and maintenance costs, costs of effectiveness studies, stocking and managing for the species, and incremental costs of consultation.

Response: As described in Exhibit 3–6, the draft economic analysis quantifies the following costs associated with fish passage facilities: installation, species survival studies, installation and maintenance of fish screens, and water quality and temperature controls. The analysis also includes administrative costs of consultation. The final economic analysis incorporates new information on the potential operation and maintenance costs for fish passage facilities. Stocking and management of the species is not considered to be related to critical habitat and is, therefore, appropriately not quantified in the economic analysis.

Comment 25: Verso Paper Corporation comments that it operates four hydropower dams to power its mill on the Androscoggin. The draft economic analysis estimated that the cost of constructing fish lifts for fish passage at each dam would be approximately $2.5 million each. While $2.5 million constitutes only a moderate impact according to the NMFS 4(b)(2) report, the combined effect of $10 million for all four dams is a significant economic impact. Further, these estimates do not include costs of conducting species survival or water quality studies, or installing fish screens. These costs, along with increases in energy costs and impacts of programmatic changes, make it clear that the economic impacts to the Androscoggin mill are very high.

Response: The 4(b)(2) analysis was not conducted on a project-by-project basis, but on the sub-watershed (ten digit hydrologic unit code, or HUC) scale. That is, the total economic impacts of salmon conservation to all economic activities were summed by HUC. Of the four dams discussed here that support the Androscoggin mill, three (Riley, Jay, and Livermore) occur within the same HUC; the remaining dam (Otis) occurs in a separate HUC. Economic impacts by HUC therefore include the costs of fish lift construction for all dams within the HUC, as well as the impacts of conducting species survival and water quality studies, and installing fish screens (see exhibit 3–8 of IEc, 2009). As described in the economic analysis, to the extent that programmatic changes may also be requested as a result of critical habitat, the quantified impacts are an underestimate of the total impacts.

We believe that the HUC 10 watershed scale is an appropriate scale in which to conduct the ESA section 4(b)(2) analysis as there is insufficient information to accurately describe the economic impact for all individual projects within the DPS, nor is there sufficient information to accurate describe the physical and biological features directly associated with each project. Even though there may be sufficient information for some projects to conduct this scale of analysis, by not having sufficient records for all projects in the DPS we can not fairly conduct a cost benefit analysis by conducting a project based analysis for some, and a watershed based analysis for others.

Comment 26: A commenter stated that the hydropower analysis incorrectly assumes a 50-year license term for the re-licensing of hydroelectric projects over which impacts are discounted at an annual rate of seven percent. While the license for a new project may be for terms up to 50 years, a typical term for the re-licensing of an existing project is 30 years.

Response: The draft economic analysis uses information from the FERC re-licensing schedule on the re-licensing dates for each dam and calculates present value impacts according to the expected year of re-licensing. The analysis does not assume that all licenses have a 50-year term. The present value impacts are then annualized over the full 50-year time frame of the analysis.

Comment 27: One commenter stated that the draft economic analysis assumes that a fishway for fish passage would be needed at the Milford Project's Gilman Falls Dam. This dam, however, contains a free-flowing ''breach'' section of river that negates the need for any type of fish passage.

Response: As described in Section 3.4.1, the draft economic analysis applies a ''rule of thumb'' to determine whether and what type of fish passage may be requested at each dam. For main stem dams, we anticipate that fish lifts would serve as the preferred method of fish passage. The Gilman Falls Dam occurs on the main stem Penobscot River; the draft economic analysis therefore assumed a fish lift may be required. We believe that salmon should be able to pass this dam at most, but not all, times of the year, as it is a low head dam. While another type of fish passage may therefore be appropriate at this site (*e.g.*, a fish ladder), the economic analysis conservatively assumes it is possible that fish passage will need to be incorporated at this site.

Comment 28: One commenter stated that the draft economic analysis relies heavily on overly generalized assumptions and provides an example of the main stem Milford Dam. For this project, the draft economic analysis estimated present value impacts of $232 (IEc, 2008), compared with the company's estimate of $7.6 million to implement the agreed upon fish passage measures that include installation of a fish lift as part of the Penobscot River Restoration Plan.

Response: Section 3.4.1 of the draft economic analysis notes that it does not include economic impacts associated with providing fish passage at Milford and a bypass at Howland Dam where plans to improve fish passage have already been developed. The $7.6 million dollar cost will be incurred independent of any critical habitat decision and is therefore not an impact of the rule. At these facilities, the impact of the rule is limited to the administrative costs of conducting a section 7 consultation at the time of dam relicensing.

Comment 29: One commenter asks whether the analysis of the impact on electricity production would change if the Penobscot River Restoration Project (PRRP) were taken into account.

Response: The economic analysis attempts to isolate and quantify the costs of potential project modifications that result specifically from the designation of critical habitat. With regard to the PRRP, a plan has already been established independent of the designation of critical habitat for four projects on the Penobscot River. This plan incorporates project modifications that meet or exceed the measures that might otherwise be requested to avoid or minimize adverse modification of critical habitat. As a result, we do not anticipate that critical habitat designation would affect the design or implementation of the PRRP, nor do we anticipate that the designation of critical habitat would affect the project's costs. Accordingly, the economic analysis assumes that the designation of critical habitat will have no impact on the PRRP.

Comment 30: One commenter requested that NMFS fully assess and quantify the economic impact that the listing of the Atlantic salmon will have on manufacturers and their employees. Specifically, the commenter suggested that it is unclear how facilities that are compliant with State standards for discharge may be affected by the listing. It further expressed concern that the listing may add uncertainty to the issuance of Maine Pollutant Discharge Elimination System (MPDES) permits, thereby affecting the ability of permitted facilities to secure financing.

Response: The ESA does not allow for consideration of economic impacts in making decisions regarding whether to list species as endangered or threatened. Economic impacts are considered in designating critical habitat for listed species.

Comment 31: One commenter stated that the ''baseline approach'' of the draft economic analysis considers only the economic impacts attributable solely to critical habitat designation and not those impacts that may be attributed co-extensively to the proposed DPS listing. The comment asserts that this approach was invalidated by the Tenth Circuit Court in *New Mexico Cattle Growers Association* v. *USFWS,* 248 F 3d 1277, 1285 (10th Cir 2001), which held that the Services must consider all impacts of a proposed designation, even those attributed coextensively to the listing. The commenter stated that the Tenth Circuit is the only Federal Circuit Court of Appeals that has considered the issue. In addition, the commenter stated that because the status of the listing is uncertain, attempts to measure incremental impacts as distinct from listing are tentative and misleading.

Response: As noted in the response to Comment 30, above, the ESA precludes consideration of economic impacts in making listing determinations but allows consideration of such impacts in conjunction with designating critical habitat. To the extent possible, the economic analysis attempts to quantify the impacts associated specifically with the designation of critical habitat, as these are the economic impacts that stand to be affected by a critical habitat designation decision. In some cases, the analysis acknowledges that it is difficult to determine what may be the causative factor for a conservation measure—the listing or the critical habitat designation. In these cases, the draft economic analysis conservatively includes such impacts and notes the uncertainty. The economic analysis does not include, however, impacts of conservation measures determined by NMFS to be solely due to the listing, and not associated with the critical habitat designation, as these impacts are expected to occur regardless of the critical habitat designation decision.

Since the Tenth Circuit Court decision, courts in other cases have held that an incremental analysis of impacts stemming solely from the critical habitat rulemaking is proper (*Cape Hatteras Access Preservation Alliance* v. *Department of Interior,* 344 F. Supp. 2d 108 (D.D.C. 2004); *Center for Biological Diversity* v. *United States Bureau of Land Management* 422 F. Supp. 2d 1115 (N.D. Cal. 2006). For example, in the March 2006 ruling that the August 2004 critical habitat rule for the Peirson's milk-vetch was arbitrary and capricious, the United States District Court for the Northern District of California stated,

''The Court is not persuaded by the reasoning of *New Mexico Cattle Growers,* and instead agrees with the reasoning and holding of *Cape Hatteras Access Preservation Alliance* v. *U.S. Dep't of the Interior,* 344 F. Supp 2d 108 (D.D.C. 2004). That case also involved a challenge to the Service's baseline approach and the court held that the baseline approach was both consistent with the language and purpose of the ESA and that it was a reasonable method for assessing the actual costs of a particular critical habitat designation (Id at 130). 'To find the true cost of a designation, the world with the designation must be compared to the world without it.' ''

In this final rule we use an approach consistent with the *Cape Hatteras* line of cases.

Comment 32: One commenter argued that additional time should be taken to fully assess and quantify the economic impact the listing will likely have on manufacturers and their employees located along Maine's working rivers. Specifically, the commenter suggested that it is unclear how facilities that are compliant with State standards for discharge may be affected by the listing. The commenter further expressed concern that the listing may add uncertainty to the issuance of MPDES permits, thereby affecting the ability of permitting facilities to secure financing.

Response: As mentioned in the response to Comment 30, economic impacts are not allowed to be considered in relation to listing decisions, but the ESA allows consideration of such impacts in conjunction with designating critical habitat. Section 5.3.1 of the economic analysis considers the potential effect of critical habitat designation on licensed discharge facilities. Specifically, this section notes that NMFS records indicate that there have been no section 7 consultations regarding discharge permits since the Atlantic salmon was listed. Further, EPA has not objected to and federalized any MPDES permits due to concerns for salmon. The economic analysis, therefore, does not anticipate that the issuance of these permits is likely to result in consultation regarding salmon and its habitat.

ESA Section 4(b)(2) Report

Comment 33: Several commenters expressed concern that we only chose to exclude areas if the specific area had low biological value and a correspondingly higher economic cost, but if the area had no dams, then those areas were also ineligible for exclusion.

Response: The Secretary of Commerce (Secretary) has discretion in balancing the statutory factors, including what weight to give those factors. The ESA provides the Secretary with the discretion to consider areas for exclusion based on the economic impact, or any other relevant impact, so long as a determination is made that the benefits of exclusion outweigh the benefits of designation, and so long as the exclusion will not result in extinction of the species concerned. The benefits of designation are to ensure that there is sufficient habitat with essential features needed to support recovery objectives. Given that Atlantic salmon are in danger of extinction in the foreseeable future, we used our discretion to only consider those areas for exclusion that have relatively low biological value and correspondingly higher economic cost.

In our analysis, we set criteria to weigh the economic cost of designating critical habitat against the biological benefit of designating critical habitat in order to assure that sufficient habitat would remain available to achieve conservation of the species. Given that the species is in danger of extinction, we believe that all habitat of medium or high biological value, and all habitat not impeded by dams is essential to achieve conservation of the species. In this rule, in the section entitled *''Consideration of Economic Impacts, Impacts to National Security, and Other Relevant Impacts,''* subsection *''Economic Impacts''*, we expounded upon our decision to consider for exclusion only those areas with a biological value of ''1''.

We did consider a more straight forward approach for exclusion such that any areas for which the costs of designation were greater than the biological value of the area to the species would qualify for exclusion. We chose, however, to consider for exclusion only those areas that have a biological value score of ''1'' (unless the area is without dams) because excluding all specific areas for which the costs of designation were greater than the biological value of the area to the species would reduce the quantity of habitat below what is needed to achieve conservation of the species.

Comment 34: One commenter stated that the ESA 4(b)(2) analysis is flawed because NMFS's determination of whether an economic impact was low, moderate, or high was done on a comparative basis as opposed to an absolute basis. NMFS did not actually determine the economic impact to an area of a proposed critical habitat designation.

Response: The framework used to inform the section 4(b)(2) analysis was a modified cost-effectiveness analysis. The cost-effectiveness analysis allows us to compare a monetized estimate of the ''benefits of exclusion'' against the biological ''benefits of inclusion'' for any particular area. The commenter is suggesting that the only accepted way to conduct an ESA 4(b)(2) exclusion analysis is with a cost benefit analysis. However, the approach we used, a cost-effectiveness analysis, is acceptable for 4(b)(2) exclusion analysis (U.S. OMB, 2003).

The Office of Management and Budget has acknowledged the cost-effectiveness analysis (CEA) as an appropriate alternative to benefit-cost-analysis (U.S. OMB, 2003). The CEA provides a rigorous way to identify options that achieve the most effective use of the resources available without requiring monetization of all of the relevant benefits or costs. The CEA was used in designating critical habitat for the Gulf of Maine DPS of Atlantic salmon, whereby we differentiated among habitat areas based on their relative contribution to conservation based on habitat characteristics and best professional judgment. These qualitative ordinal valuations were then combined with estimates of the monetized economic costs of critical habitat designation. In essence, individual habitat areas are assessed using both their biological valuation and economic cost, so that areas with high conservation value and lower economic cost have a higher priority for designation, and areas with low conservation value and higher economic cost have a higher priority for exclusion. Using the Secretary's discretion in balancing the statutory factors, only those areas with low biological value were considered for economic exclusion, given that excluding areas of higher biological value would remove protections to habitat needed to achieve conservation of the species.

Comment 35: One commenter stated that, ''[p]roposed designated critical habitat on Plum Creek lands does not require special management or protection * * * [we] implement practices that provide on-the-ground conservation outcomes that benefit Atlantic salmon and address the primary constituent elements (PCEs) of salmon habitat in Maine.''

Response: As stated in section 4(b)(2) of the ESA, the Services may exclude any area from critical habitat if it is determined that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat. Based on the best scientific and commercial data available, including Federal and State natural resource protection regulations, we determined that designation of critical habitat in Maine, including Plum Creek lands, is necessary to protect Atlantic salmon from extinction. Furthermore, the fact that on-the-ground conservation measures are being implemented for Atlantic salmon habitat is evidence of the need to manage the essential features of the habitat.

We recognize that many organizations implement practices that provide on-the-ground outcomes that benefit Atlantic salmon, but these practices have not been provided to the Services for thorough review to determine their conservation benefit to Atlantic salmon. Plum Creek states that it fully complies with Maine's Best Management Practices (BMPs) and believes these practices to be protective of salmon habitat. While many of the BMPs do provide protections to Atlantic salmon, there are many aspects that we feel may affect Atlantic salmon habitat and, therefore, require further review. For example, we state that a 30-meter buffer is generally required to provide protections to critical habitat. The 30-meter buffer has been identified as what is generally required to maintain or restore optimal habitat in fish-bearing streams (Murphy, 1995) and necessary to protect invertebrate communities (Erman and Mahoney, 1983) that salmon require for forage. Murphy (1995) further states that narrower buffers or selective harvest within the buffers may not provide for maintenance of large woody debris contributions into the stream over the long term. Plum Creek's review of Maine's BMPs prescribe a tiered approach where some streams have no buffer protection, others have a 75-foot (22.9-m) buffer, and others have up to a 250-foot (76.2-m) buffer but still allow for removal of up to 40 percent of the canopy. Based on the best scientific and commercial data available, including Federal and State natural resource protection regulations, we determined that designation of critical habitat in Maine, including Plum Creek lands, is necessary to protect Atlantic salmon from extinction.

Miscellaneous Comments

Comment 36: Two commenters stated that appropriate documentation under the National Environmental Policy Act (NEPA) must be prepared by the Services and published for the public review process prior to any final rules on critical habitat designation that impact the physical environment.

Response: NEPA does not apply to designations of critical habitat under the ESA. The reasons underlying this determination, mainly that designation of critical habitat is a non-discretionary statutory obligation in relation to the listing of a species under the ESA, reflects an opinion from the Ninth Circuit Court of Appeals (see *Douglas County* v. *Babbitt*, 48 F.3d 1495 (9th Cir. 1995), cert. denied, 116 S.Ct. 698 (1996)). In accordance with the decisions of the Ninth Circuit Court, we believe that NEPA documentation is not required for the designation of critical habitat within the range of the GOM DPS.

Comment 37: A commenter requested that we revise the critical habitat designation proposal for the Penobscot and Kennebec watersheds. The revised proposal should, at a minimum, exclude potential critical habitat designation for Atlantic salmon in the Androscoggin River and other areas, as appropriate, based upon the updated analyses.

The commenter felt that critical habitat for the expanded DPS should be published separate from the Downeast River final rule, but not before the end of the 1-year window permitted in the ESA following the initial September 5, 2009, proposal. The Notice should request, and give adequate time for, public comments on the revised proposal prior to issuance of any final rule or designation in the Penobscot or Kennebec Rivers.

Response: The ESA states that a final regulation designating critical habitat of an endangered species or threatened species shall be published concurrently with the final regulation implementing the determination that such species is endangered or threatened. Exceptions to this are if critical habitat of such species is not determinable, in which we would be allowed 1 year from the time of listing to make such a determination. For Atlantic salmon, we have an abundance of information on which a determination of critical habitat can be based, and, therefore, a ''not determinable'' decision is not supportable in this case.

Comment 38: Two commenters requested that both the critical habitat rule and DPS listing rule be delayed until additional information relating to the adequacies of regulations pertaining to waste water discharge and water withdrawal programs can be further reviewed.

Response: The June 1, 2009, publication due date for the final rule designating critical habitat for Atlantic salmon was determined by a judicially approved settlement agreement between the Center for Biological Diversity, Conservation Law Foundation, and NMFS. We feel that asking the plaintiffs and the court to agree to an extension of that date to conduct further evaluation of existing regulations is unwarranted. The adequacy of existing regulatory mechanisms is evaluated in the listing determination, though it is not something that is considered in designating critical habitat. Designating critical habitat is designed to protect habitat features essential to the conservation of the endangered or threatened species. In doing so, we are required to identify the habitat features that may require special management or protections. As such, several activities were identified as affecting habitat features or as activities that we believe may have an effect on habitat features either now or in the near future. By identifying these activities, we are stating that if a Federal action agency were to fund, carry out, or authorize one or more of these activities, then the Federal action agency should consult with the Services on that action. At that point, the Services, in conjunction with the action agency, will make a determination, specific to that project, on whether or not existing regulatory mechanisms are sufficiently protective of the habitat features that we identified, or whether the action may affect the habitat features and, therefore, may require formal or informal consultation. During this consultation process, modifications to the project may be required to minimize or eliminate the effect on the habitat feature.

Comment 39: One commenter stated that the **Federal Register** notice for critical habitat correctly identifies dams as the primary threat to Atlantic salmon, but falls short of recognizing or recommending that the cumulative impacts of dams be addressed if Atlantic salmon are going to be restored in the Androscoggin, Kennebec, and Penobscot Rivers. The commenter urges us to directly address the need for dam removal rather than focus on fishways that we know cannot ameliorate the cumulative impact of dams.

Response: The biological valuation portion of the critical habitat designation does account for cumulative impacts of dams in the determination of the ''functional habitat units'' score of habitat units within the range of the GOM DPS. Through our scoring system, the functional habitat units score accounts for dams not only within a particular HUC 10, but also downstream of that HUC 10, thereby addressing the issue of cumulative impacts associated with each dam encountered by a fish making its way to or from a particular HUC 10.

We do not address the needs of dam removal directly in the critical habitat designation as this would not add information necessary in making a determination of critical habitat. When conducting the economic analysis, we had to determine a course of action that may be required of the hydropower companies in order to estimate the economic impact. Given that we do not have the resources or the time to fully assess the most appropriate course of action for each and every dam within the Gulf of Maine DPS, we developed a general list of the types of modifications that may be required by the dam owner if their dam is within critical habitat. In some circumstances, these modifications may be the most appropriate course of action. In other circumstances, more or less stringent modifications may be required of the dam owner depending on the amount the project affects critical habitat and what is required to prevent jeopardy or adverse modification and achieve recovery of the species. The need for dam removal or improved fish passage for specific projects will be addressed in a recovery plan for the expanded GOM DPS and in individual section 7 consultations on projects during re-licensing or licensing.

Comment 40: A commenter stated that the Services need to be more aggressive in dealing with numerous and well-documented problems associated with elevated levels of acidity, low buffering capacity, and lack of important nutrients in our rivers and strongly recommend pursuing a pilot terrestrial liming/calcium enhancement project on a meaningful scale in order to address these known problems.

Response: Acidification of surface waters has been identified in numerous planning documents, including the NRC report on Atlantic salmon in Maine (2004), the Final Recovery Plan for Atlantic Salmon (NMFS and FWS, 2005) and the Status Review for Atlantic Salmon (Fay *et al.*, 2006). Acidification of surface waters has been well documented to have detrimental effects on Atlantic salmon, particularly smolts. Whether anthropogenic acidification of surface waters is affecting the GOM DPS, and to what extent, is still widely debated. A combination of low pH and high labile aluminum can reduce the physiological function of the gill membrane and in turn, cause direct or indirect mortality to a smolt as it attempts to enter sea water. Since the 1980s, researchers have been working hard to understand acidification of surface waters in Maine, particularly in the region east of the Penobscot River. Haines *et al.* (1990) reported that, when Atlantic salmon smolts were subjected to elevated acidity and elevated aluminum concentrations, a combination of pH less than 5.5 and exchangeable aluminum concentration greater than 200 mg/l caused osmoregulatory stress. Since this time, numerous and extensive efforts have been undertaken to understand the role of acidification on Atlantic salmon survival, particularly in the Downeast Region of Maine. Furthermore, even though it has been widely acknowledged that emissions of sulfates and nitrates contribute significantly to acidification of surface waters, in Maine there are differing views as to how much of the acidity is directly associated with these emissions. In Downeast Maine, there is uncertainty among researchers and biologists on how much of the acidity in Downeast rivers is naturally occurring from the high levels of dissolved organic matter and what portion of the acidity originates from exogenous sources such as sulfate and nitrate emissions, marine aerosols, or land-use activities (*e.g.*, forestry and agricultural practices). At this point, we recognize that some rivers and streams are impaired by low pH and high aluminum concentrations, but we do not believe that there is substantive information to suggest that the GOM

DPS is significantly impaired at the population level as a result of anthropogenic acidification. Whether the Services should undertake liming or calcium enhancement to offset the effects of low pH is an issue that will need to be pursued in the development of a recovery plan and is not related to the designation of critical habitat.

Comment 41: One commenter stated that the critical habitat designation fails to consider the essential migratory nature of Atlantic salmon * * * Atlantic salmon will not stay in just those areas of a watershed that are designated as critical habitat.

Response: During our designation process we identified all areas currently occupied by the listed GOM DPS of Atlantic salmon. All areas currently occupied by the species have been designated as critical habitat, with exceptions of areas excluded as part of the 4(b)(2) process and marine areas as described in this final rule, section titled: Identifying the Geographical Area Occupied by the Species and Specific Areas within the Geographical Area. Areas not designated as critical habitat within the GOM DPS are areas that are currently inaccessible to Atlantic salmon due to either natural or man-made barriers or areas that do not have the physical and biological features essential to the conservation of the species. In order to designate critical habitat outside the current GOM DPS we would need to make the determination that those areas are essential to the conservation of the species. At present, we have determined that enough habitat is available within the occupied portions of the GOM DPS to conserve the species regardless of whether salmon migrate outside this habitat area. Therefore, habitat in unoccupied areas within or outside of the GOM DPS is not essential to the conservation of salmon and not appropriate for designation as critical habitat.

Comment 42: A commenter felt we should provide more region specific review of habitat variability and threats in our source document (Habitat Requirements and Management Considerations for Atlantic salmon in the GOM DPS).

Response: The biological valuation (NMFS, 2009a) does provide SHRU specific biological reports that describe the variability of physical and biological features essential to the conservation of the species within and among the individual SHRUs. Additionally, these SHRU specific biological reports provide general descriptions of activities that may affect the physical and biological features essential to the conservation of the GOM DPS within each SHRU.

Comment 43: One commenter stated that the effects of dams are overstated. The commenter felt that even though dams do impact migration and survival, marine survival is the biggest factor limiting recovery. The commenter further states that dams are not the driving force in the decline as evidenced by rivers with no barriers to migration but with the same declines as rivers with barriers.

Response: In the 4(b)(2) report (NMFS, 2009b), we fully acknowledge the importance of marine survival and the fact that it is a very significant limiting factor in the recovery of the GOM DPS. However, critical habitat may not be designated within foreign countries or in other areas outside of the jurisdiction of the United States (50 CFR 424.12(h)). Furthermore, we are not able, at this time, to identify the specific features characteristic of marine migration and feeding habitat within waters under U.S. jurisdiction essential to the conservation of Atlantic salmon and are, therefore, unable to identify the specific areas in the marine environment where such features exist. Therefore, specific areas of marine habitat are not designated as critical habitat. We also do not feel that the effect of dams is overstated. The National Research Council stated in 2004 that the greatest impediment to self-sustaining Atlantic salmon populations in Maine is obstructed fish passage and degraded habitat caused by dams. As the commenter acknowledged, we relied heavily on Fay *et al.* (2006), which provides a comprehensive review of the studies that support this conclusion. Dams have been found to result in direct loss of production habitat, alteration of hydrology and geomorphology, interruption of natural sediment and debris transport, and changes in temperature regimes (Wheaton *et al.*, 2004). Riverine areas above impoundments are typically replaced by lacustrine (lake or pond) habitat following construction. Dramatic changes to both upstream and downstream habitat caused by dams directly result in changes in the composition of aquatic communities, predator/ prey assemblages, and species composition (NRC, 2004; Fay *et al.*, 2006; Holbrook, 2007). Upstream changes in habitat are known to create conditions that are ideal for Atlantic salmon predators such as chain pickerel, smallmouth bass, and double crested cormorants (Fay *et al.*, 2006). Furthermore, dams not only change predator/prey assemblages, dam passage is known to negatively affect predator detection and avoidance in salmonids (Raymond, 1979; Mesa, 1994; Blackwell and Krohn, 1997; Holbrook 2007). Adults may also be susceptible to predation when they are attempting to locate and pass an upstream passage facility at a dam in conjunction with higher summer temperatures (Fay *et al.*, 2006; Power and McCleave, 1980).

Providing highly effective fish passage both upstream and downstream at impoundments is very important. However, that does not negate the fact that even passage facilities contribute to Atlantic salmon mortality. Passage inefficiency and delays occur at biologically significant levels, resulting in incremental losses of pre-spawn adults, smolts, and kelts. Dams are known to typically injure or kill between 10 and 30 percent of all fish entrained at turbines (EPRI, 1992). With rivers containing multiple hydropower dams, these cumulative losses could compromise entire year classes of Atlantic salmon. Studies in the Columbia River system have shown that fish generally take longer to pass a dam on a second attempt after fallback compared to the first (Bjornn *et al.*, 1999). Thus, cumulative losses at passage facilities can be significant and are an important consideration.

Comments on Issues Outside of the Scope of this Rule

There were a number of comments and suggestions that are not directly related to the designation of critical habitat. These included suggestions on collaboration versus regulation, comments on the inadequacy of existing State regulations, comments on the National Pollution Discharge Elimination System (NPDES), comments on river classification, comments related to the listing of Atlantic salmon in particular rivers under the ESA (inclusion or exclusion of certain rivers), and remarks on the timing of the critical habitat designation given the U.S. economic slow down. Given that these comments do not affect the critical habitat designation process, we will not be providing detailed responses in this rule. Comments that were submitted in response to the proposed critical habitat designation, but appear to be more related to the listing rule, will be addressed in that listing action.

Remarks

(1) After the close of the comment period, we were informed that the watershed delineations represented as HUCs had recently undergone some revisions that would alter the boundaries of some of the HUC 10 watersheds used to represent specific

areas within the GOM DPS. In our determination of specific areas, we identified the HUC 10 watershed scale as appropriate given that the HUC 10 watershed is the approximate scale in which Atlantic salmon are currently managed. The HUC 10 scale was also appropriate because we had sufficient information to analyze each specific area for habitat value and economic cost. When we were made aware of the modifications, we carefully assessed the implications of the modifications and whether it would be necessary to reconfigure our designation based on the modifications. ESA section 3(5)(A) states that we are to identify specific areas within the geographical area on which are found those physical and biological features essential to the conservation of the species and which may require special management or protections. Section 3(5)(C) further states that, except in circumstances determined by the Secretary, critical habitat shall not include the entire geographical area which can be occupied by the threatened or endangered species. The Services' regulations further state in 50 CFR 424.12(c) that each critical habitat will be defined by specific limits using reference points and lines as found on standard topographic maps of the area. Each area will be referenced to the State(s), county(ies), or other local governmental units within which all or part of the critical habitat is located. Unless otherwise indicated within the critical habitat descriptions, the names of the State(s) and county(ies) are provided for information only and do not constitute the boundaries of the area. Ephemeral reference points (*e.g.*, trees, sand bars) shall not be used in defining critical habitat. Based on the ESA and agency regulations, we concluded that reconfiguration of the HUC 10 watersheds based on this update was unnecessary for the following reasons: (1) Considering the guidance, we have a fair amount of discretion in defining the scale, size, and shape of the area used to represent the specific area in which critical habitat is analyzed; (2) the HUC 10 watershed scale, regardless of size or shape, does not influence salmon biology or salmon behavior; (3) we can make available to the public maps that clearly identify the specific areas and the critical habitat within those areas; and (4) we clearly identify the specific State(s), county(ies), and town(s) in which all or part of the critical habitat is located.

(2) In the proposed rule (50 CFR 51747; September 5, 2008) summary paragraph, we stated that there were 203,781 km of perennial river, stream, and estuary habitat proposed for designation as critical habitat. This number was in error, and the actual kilometers proposed for designation was 20,378 km. The habitat kilometers in the summary tables in Part 226 of the proposed rule were correct.

III. Summary of Revisions

We evaluated the comments and the new information received in response to the proposed rule to ensure that our final rule contained the best scientific data available. Some of the comments and new information has resulted in a number of general changes to the critical habitat designations. A review of the comments that triggered those changes and a summary of the changes that were made are included in this section:

(1) One commenter noted that on Page 9, Criterion (a) of the biological valuation (NMFS, 2008a) we do not specify the time frame in which salmon have been documented in a specific area for the area to be considered occupied. Another commenter expressed concern over our perceived use of the ''Fish Friends'' program overseen by the Atlantic Salmon Federation as a criterion for occupation. On page 9 of the biological valuation we identify two criteria, that if either are met, would warrant the area to be considered occupied by the species.

The text in criterion (a) has been modified to include the timeframe of 6 years, which is consistent with the timeframe expressed in criteria (b), and we did remove reference to the Fish Friends program on the basis that under no circumstance were specific areas determined to be occupied solely based on the stocking of fry from this program. These modifications were made in the final rule section titled *Identifying the Geographical Area Occupied by the Species and Specific Areas within the Geographical Area.*

(2) Several commenters asked that we clarify the approach used to bin economic costs as well as how cost thresholds were assigned and how specific areas were considered for economic exclusions.

In order to compare economic cost to biological value in the exclusion process we needed to assign a value with which we could compare unlike values (*e.g.*, dollar amounts vs. biological value). In order to create like values for both the economic costs and final biological values we chose to bin the biological and economic data into three categories (high, medium, low) in order to consider exclusions. In the proposed rule we state that we binned the economic costs into three categories to represent low, medium and high economic costs, but did not explain why or how we did this binning. We modified the text in the final rule section—*Consideration of Economic Impacts, Impacts to National Security, and Any Other Relevant Impacts* to explain why and how we did the binning of the economic cost.

(3) A commenter stated that the algorithm used to arrive at functional habitat units is difficult to follow, in part because it is described in two separate sections. A unified section describing this process would be helpful, as would a formulaic representation of the process.

The section of the final rule ''*Specific areas outside the geographical area occupied by the species * * * essential to the conservation of the species*'' has been modified by consolidating the explanation of how functional habitat units were derived and developing a formulaic expression for the process used to calculate functional habitat units.

(4) A commenter noted that Belfast Bay is missing from the economic exclusion in the table on pg 51780 of the proposed rule.

In 50 CFR 226.217(b)(6), Table (ii) of the proposed rule we outline all the specific areas that contain critical habitat, the quantity of critical habitat within the specific areas as well as the quantity of critical habitat that we proposed for exclusion, and the type of exclusion. In the Penobscot Bay sub-basin, we identified Belfast Bay (HUC code 0105000218) as having 177 km of river, stream, and estuary, and 9 square km of lake critical habitat. The area was identified in the preamble and in the maps of 50 CFR Part 226.217(b)(6) of the proposed rule as being proposed for exclusion based on economics. We have modified the table to show that the habitat in Belfast Bay is excluded from critical habitat on the basis of economic cost in comparison with biological value.

(5) A commenter questioned our use of the language ''not likely to become threatened'' that was used in the development of recovery criteria described in the section entitled *Specific areas outside the geographical area occupied by the species * * * essential to the conservation of the species* of the final rule, and suggested that our targets should be referred to as benchmarks for recovery. We modified this section of the final rule as well as the biological valuation by removing the language ''not likely to become threatened''. A recovered population is one that is neither threatened nor

endangered, or otherwise a population that is not likely to become an endangered species in the foreseeable future. The specific criteria that we have proposed for recovery for the sake of estimating the quantity of habitat needed to support a recovered population has not changed. The recovery criteria will remain as draft until they are more thoroughly examined through the recovery planning process.

(6) According to multiple comments, the draft economic analysis underestimates the impacts of providing fish passage at hydropower facilities. Specifically, one comment notes that the draft economic analysis estimates the average cost of installing a fish lift to be $2.7 million whereas the installation of three known fish lifts over the past 15 years ranged in cost from $3.3 million to $7.8 million. Specific information on the fish lift and ladder costs were provided for FPL Energy hydro projects by the commenter. Likewise, Topsham Hydro Partners stated that its fish passage facilities cost in excess of $4 million.

To address this, the final economic analysis incorporates the available project-specific cost estimates for fish ladders and lifts provided by the commenters to estimate the average costs of these project modifications.

(7) Exhibit 3–10 in the draft economic analysis presents a range of impacts associated with decreased power production in May in the case that changes in operations are requested for the purposes of salmon conservation. A commenter stated that the range presented is misleading as the low end cost represents the lost power generation being replaced by the next cheapest source of energy. By virtue of being a lower cost, however, this next cheapest source would already be on line. Therefore, only the highest cost replacement power would occur and only the high end costs should be considered.

The final economic analysis was modified to address this comment by removing the low end cost of the range presented in the draft economic analysis, assuming the replacement generation will most likely come from natural gas.

(8) A commenter stated that the draft economic analysis fails to show how the present value costs for each dam were calculated from the averages provided in the report.

To address this comment exhibit 3–7 from the draft economic analysis has been revised in the final economic analysis to make transparent the derivation of the per dam present value costs.

(9) A commenter stated that NMFS should consider that hydropower is a clean and renewable energy source, and reducing its production and replacing it with increased burning of fossil fuels would have environmental costs.

In the final economic analysis and energy impact analysis we incorporated a qualitative discussion recognizing that environmental costs would occur in the case that lost hydropower generation were replaced with increased burning of fossil fuels.

(10) Brookfield Renewable Power Inc. commented that the draft economic analysis fails to include all of its dams within the study area, missing five dams on the West Branch of the Penobscot River which are part of Federal Energy Regulatory Commission (FERC) No. 2634. Further, in the case of the Caucomgomoc Dam, the draft economic analysis does not accurately portray existing fish passages.

The draft economic analysis considers four Brookfield Power dams on the Penobscot River as part of FERC No. 2634. Due to information provided by Brookfield in follow up to this comment, the final economic analysis considers an additional four previously unlicensed dams that are now licensed and will be in operation this year along the West Branch of the Penobscot. Brookfield additionally provided information on the fish passage status of these dams.

(11) The FERC stated that the draft economic analysis underestimates the number of tidal/wave energy projects that may be licensed over the 20-year time period of the analysis. The FERC anticipates that there may be as many as 134 permit applications leading to about 13 projects over the next 20 years.

Chapter 3 of the final economic analysis has been revised to incorporate more information on the potential for future projects and their locations. To provide additional context, the analysis also describes modifications to hydrokinetic projects on the west coast that have been requested for projects affecting Pacific salmon.

(12) The Regulatory Flexibility Analysis (RFA) describes the potential impact to small farms in terms of the percentage of estimated annual revenues. A commenter stated that a true impact on a small farm would be the impact on net income because the farm may benefit from economies of scale. For small farms, any reduction in income may put them out of business.

In the RFA, the impacts to small farmers are presented as a percentage of annual revenue to provide perspective on the level of impact. We agree that presenting impacts as a percentage of net income would be appropriate and would do so if sufficient data were available. A qualitative discussion addressing this issue is incorporated in the final economic analysis.

(13) A commenter stated that we were unclear on whether both upstream and downstream passage efficiency estimates were figured into the 85 percent passage efficiency when calculating the functional habitat units.

To determine whether any unoccupied habitat in the GOM DPS should be designated as critical habitat, we assessed the quantity of habitat for each HUC 10 watershed. The total quantity of habitat was then discounted to provide a functional habitat value based on the habitat's quality and the number of dams within and below the HUC 10 watershed. Therefore, the functional value of areas with low quality habitat or dams would be less than the total measured habitat quantity. In the proposed rule we did not state whether the dams were figured into the equation to account for upstream, downstream, or both upstream and downstream migration. We modified the section of the final rule entitled ''*Specific areas outside the geographical area occupied by the species * * * essential to the conservation of the species*'' to clarify that only downstream passage efficiency was figured into the equation to calculate functional habitat units.

This was done because we designated habitat based on what was sufficient to support the offspring of a recovered population. We identified a recovered population for the purpose of designating critical habitat as 2,000 adult spawners within each SHRU. The next generation of adult returns does not directly influence the quantity of nursery habitat needed to support the offspring of the original 2,000 adult spawners. Assuring that passage is sufficient to sustain the recovered population is part of the recovery strategy and is something that will be addressed in the recovery plan.

(14) Several commenters indicated that the HUC labels are confusing and make interpretation difficult.

The HUC 10 watershed delineations are pre-established watershed delineations made available through USGS. We used the names and HUC codes already established in the dataset for describing critical habitat. We acknowledge that some of the names can be misleading, but these codes and names are standardized by the USGS. In order to address the confusion regarding the names of the HUC 10s and where the HUC 10 watersheds are specifically, we have provided a more detailed map in the end of the final rule and have also made detailed maps available on our Web site at *http://www.nero.noaa.gov/prot_res/altsalmon/*.

HUC 0104000203 and 0104000204 were identified as being easily confused because both HUCs were assigned the name ''Ellis River.'' HUC 0104000204 is below Rumford Falls and includes the Swift River and is historical Atlantic salmon habitat while HUC 0104000203 is above Rumford Falls and historically was not Atlantic salmon habitat.

(15) One commenter stated that the approach outlined in the proposed critical habitat to assign cost thresholds and how specific areas were considered for economic exclusions needed further clarification.

In the 4(b)(2) analysis, in order to compare economic cost to biological value, we needed to assign a value with which we could compare unlike values (*e.g.*, dollar amounts vs. biological value). In order to create like values for both the economic costs and final biological values, we chose to bin the original data into three categories (high, medium, low) in order to make determinations of exclusions between the two variables. Clarification of the procedures used to bin economic cost is included in the 4(b)(2) report (NMFS, 2009b) and in section III of this final rule.

(16) The Navy commented stating that they are opposed to critical habitat for the Atlantic salmon on properties owned, controlled by, or designated for use by the Department of Defense pursuant to section 4(a)(3)(B)(i) and 4(b)(2) of the ESA. Military sites with military missions excluded from critical habitat include: Brunswick Naval Air Station's Main Station in Brunswick, ME; the Brunswick Naval Air Station's Great Pond Outdoor Adventure Center (OAC) in the town of Great Pond; the Brunswick Naval Air Stations Cold Weather Survival, Evasion, Resistance, and Escape School (SERE) in Redington Township near Rangeley, ME, and the Brunswick Naval Air Station's Naval Computer and Telecommunications Atlantic Detachment Center in Cutler, Maine. The Navy further requests that Bath Iron Works (BIW) in Bath, ME, be excluded from critical habitat. The Navy asserts that BIW conducts activities essential to the operations of the Navy's fleet and the Navy describes these activities as inherent to national security.

In the proposed rule we stated that we had contacted the Department of Defense and requested information on the existence of INRMPs for the Brunswick Naval Air Station's Maine Station in Brunswick, and the Naval Air Station's Cold Weather Survival, Evasion, Resistance, and Escape school and the benefits any INRMPs would provide to Atlantic salmon. If any INRMPs covering these sites were determined, in writing, to provide a benefit to Atlantic salmon, we would be precluded from designating the habitat within these sites (section 4(a)(3)(B)(i) of the ESA). INRMPs that provide a benefit to Atlantic salmon are in place for these two areas, and, therefore, these areas do not meet the definition of critical habitat and are not be included in this final rule. In this final rule we also exclude the Great Pond Outdoor Adventure Center in Great Pond, ME, the Brunswick Naval Air Station's Naval Computer and Telecommunications Atlantic Detachment Center in Cutler, Maine, and Bath Iron Works in Bath, ME, based on the required benefits analysis of section 4(b)(2) of the ESA. A full description of military lands that do not meet the definition of critical habitat (section 4(a)(3)(B)(i) of the ESA or that are excluded under section 4(b)(2) of the ESA is included in this final rule under section V (Application of ESA Section 4(a)(3)(B)(i)) and section VI (Application of ESA Section 4(b)(2)).

(17) A commenter stated that though it may not be the intent of the NMFS, the commenter believes the current wording that implies that the presence of an Atlantic Salmon Federation (ASF) Fish Friends school program qualifies a watershed for designation as critical habitat. ASF wants to make sure that no areas within the DPS were considered occupied solely and exclusively because of the presence of juvenile salmon from the Fish Friends program.

In the final rule section Identifying the *Geographical Area Occupied by the Species and Specific Areas within the Geographical Area*, we have taken out the reference to the Fish Friends school program as being an impetus for designating critical habitat in a specific area as there are no circumstances where a HUC 10 watershed was considered for designation as critical habitat solely based on the stocking of fish through the Fish Friends program.

(18) In the final listing rule, the GOM DPS was redefined to exclude those areas outside the historic range of the species. In the re-defined DPS, the following impassable falls delimit the upstream extent of the freshwater range: Rumford Falls in the town of Rumford on the Androscoggin River; Snow Falls in the town of West Paris on the Little Androscoggin River; Grand Falls in Township 3 Range 4 BKP WKR, on the Dead River in the Kennebec Basin; the un-named falls (impounded by Indian Pond Dam) immediately above the Kennebec River Gorge in the town of Indian Stream Township on the Kennebec River; Big Niagara Falls on Nesowadnehunk Stream in Township 3 Range 10 WELS in the Penobscot Basin; Grand Pitch on Webster Brook in Trout Brook Township in the Penobscot Basin; and Grand Falls on the Passadumkeag River in Grand Falls Township in the Penobscot Basin.

In the critical habitat analysis, we analyzed the entire Penobscot, Androscoggin, Kennebec, and Downeast Coastal Basins. All of the HUC 10 watersheds outside the historic range were determined to have no biological value to Atlantic salmon and were subsequently not evaluated for critical habitat with the exception of the Passadumkeag watershed (HUC code 0102000503) in the Penobscot River watershed. The Passadumkeag watershed was determined to be occupied up to Grand Falls in Grand Falls Township, though it was assigned a biological value of ''1'' because of biological quality and habitat quantity. In the ESA section 4(b)(2) exclusion analysis, the Passadumkeag was excluded from designation because it was assigned an economic score of ''2'', subsequently qualifying this watershed for exclusion. Upon the redelineation of the GOM DPS, the Passadumkeag HUC 10 watershed was cut in half so that the portion of the watershed below Grand Falls is within the GOM DPS, and the portion of the watershed above Grand Falls is outside the DPS. Given the new delineation, we needed to re-assess the biological value and economic cost scores, given that these evaluations were conducted for the entire HUC 10 watershed. In doing so, the biological value of the Passadumkeag retained its score of ''1,'' given that during the biological valuation, these falls were taken into account. The economic analysis did not take into account Grand Falls in the assessment and therefore the economic impact for the Passadumkeag needed to be re-examined. In doing so, the economic impact to the Passadumkeag watershed was reduced to an estimated high impact of $550,000, though this is not below the threshold of $338,000 which would subsequently reduce the economic score from a 2 to a 1. Thus, the Passadumkeag Watershed is eligible for exclusion under the criteria that we established.

(19) In the proposed rule (73 FR 51747; September 5, 2008) summary paragraph, we stated that there were 203,781 km of perennial river, stream, and estuary habitat proposed for designation as critical habitat. This

number was in error, and the actual kilometers proposed for designation was 20,378 km. The habitat kilometers in the summary tables in part 226 of the proposed rule were correct.

IV. Methods and Criteria Used To Identify Critical Habitat

The following sections describe the relevant definitions and guidance found in the ESA and our implementing regulations, and the key methods and criteria we used to make these final critical habitat designations after incorporating, as appropriate, comments and information received on the proposed rule. Section 4 of the ESA (16 U.S.C. 1533(b)(2)) and our regulations at 50 CFR 424.12(a) require that we designate critical habitat, and make revisions thereto, ''on the basis of the best scientific data available.''

Critical habitat is defined by section 3 of the ESA (and 50 CFR 424.02(d)) as ''(i) the specific areas within the geographic area occupied by the species, at the time it is listed in accordance with the provisions of [section 4 of this Act], on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of [section 4 of this Act], upon a determination by the Secretary that such areas are essential for the conservation of the species.'' Section 3 of the ESA (16 U.S.C. 1532(3)) also defines the terms ''conserve,'' ''conserving,'' and ''conservation'' to mean ''to use, and the use of, all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided pursuant to this chapter are no longer necessary.''

Pursuant to our regulations, when identifying physical or biological features essential to conservation, we consider the following requirements of the species: (1) Space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, or rearing of offspring; and, generally, (5) habitat that is protected from disturbance or representative of the historical geographical and ecological distribution of the species (see 50 CFR 424.12(b)). In addition to these factors, we also focus on the known physical and biological features (primary constituent elements or PCEs) within the occupied areas that are essential to the conservation of the species. The regulations identify PCEs as including, but not limited to, the following: roost sites, nesting grounds, spawning sites, feeding sites, seasonal wetland or dry land, water quality or quantity, host species or plant pollinator[s], geological formation, vegetation type, tide, and specific soil types. For an area containing PCEs to meet the definition of critical habitat, we must conclude that the PCEs in that area ''may require special management considerations for protection.'' Our regulations define special management considerations or protection as ''any methods or procedures useful in protecting physical and biological features of the environment for the conservation of listed species.'' Both the ESA and our regulations, in recognition of the divergent biological needs of species, establish criteria that are fact specific rather than ones that represent a ''one size fits all'' approach.

Our regulations state that, ''[t]he Secretary shall designate as critical habitat areas outside the geographic area presently occupied by the species only when a designation limited to its present range would be inadequate to ensure the conservation of the species'' (50 CFR 424.12(e)). Accordingly, when the best available scientific data do not demonstrate that the conservation needs of the species so require, we will not designate critical habitat in areas outside the geographic area occupied by the species.

Section 4 of the ESA (16 U.S.C. 1533(b)(2)) requires that, before designating critical habitat we must consider the economic impacts, impacts on national security, and other relevant impacts of specifying any particular area as critical habitat, and the Secretary may exclude any area from critical habitat if the benefits of exclusion outweigh the benefits of designation, unless excluding an area from critical habitat will result in the extinction of the species. This exercise of discretion must be based upon the best scientific and commercial data (16 U.S.C. 1536(a)(2)). Once critical habitat is designated, section 7(a)(2) of the ESA requires that Federal agencies, in consultation with and with the assistance of NMFS, ensure that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of critical habitat.

Atlantic Salmon Life History

Atlantic salmon have a complex life history that ranges from territorial rearing in rivers to extensive feeding migrations on the high seas. During their life cycle, Atlantic salmon go through several distinct phases that are identified by specific changes in behavior, physiology, morphology, and habitat requirements.

Adult Atlantic salmon return to rivers from the sea and migrate to their natal stream to spawn. Adults ascend the rivers of New England beginning in the spring. The ascent of adult salmon continues into the fall. Although spawning does not occur until late fall, the majority of Atlantic salmon in Maine enter freshwater between May and mid-July (Meister, 1958; Baum, 1997). Early migration is an adaptive trait that ensures adults have sufficient time to effectively reach spawning areas despite the occurrence of temporarily unfavorable conditions that occur naturally (Bjornn and Reiser, 1991). Salmon that return in early spring spend nearly 5 months in the river before spawning; often seeking cool water refuge (*e.g.*, deep pools, springs, and mouths of smaller tributaries) during the summer months.

In the fall, female Atlantic salmon select sites for spawning. Spawning sites are positioned within flowing water, particularly where upwelling of groundwater occurs to allow for percolation of water through the gravel (Danie *et al.*, 1984). These sites are most often positioned at the head of a riffle (Beland *et al.*, 1982), the tail of a pool, or the upstream edge of a gravel bar where water depth is decreasing, water velocity is increasing (McLaughlin and Knight, 1987; White, 1942), and hydraulic head allows for permeation of water through the redd (a gravel depression where eggs are deposited). Female salmon use their caudal fin to scour or dig redds. The digging behavior also serves to clean the substrate of fine sediments that can embed the cobble/gravel substrate needed for spawning and reduce egg survival (Gibson, 1993). As the female deposits eggs in the redd, one or more males fertilize the eggs (Jordan and Beland, 1981). The female then continues digging upstream of the last deposition site, burying the fertilized eggs with clean gravel. A single female may create several redds before depositing all of her eggs. Female anadromous Atlantic salmon produce a total of 1,500 to 1,800 eggs per kilogram of body weight, yielding an average of 7,500 eggs per 2 sea-winter (SW) female (an adult female that has spent 2 winters at sea before returning to spawn) (Baum and Meister, 1971). After spawning, Atlantic salmon may either return to sea immediately or remain in freshwater until the following spring before returning to the sea (Fay *et al.*, 2006). From 1967 to 2003, approximately three percent of the wild and naturally reared adults that returned to rivers where adult returns are monitored—mainly the Penobscot River—were repeat spawners (USASAC, 2004).

Embryos develop in the redd for a period of 175 to 195 days, hatching in late March or April (Danie *et al.*, 1984). Newly hatched salmon, referred to as larval fry, alevin, or sac fry, remain in the redd for approximately 6 weeks after hatching and are nourished by their yolk sac (Gustafson-Greenwood and Moring, 1991). Survival from the egg to fry stage in Maine is estimated to range from 15 to 35 percent (Jordan and Beland, 1981). Survival rates of eggs and larvae are a function of stream gradient, overwinter temperatures, interstitial flow, predation, disease, and competition (Bley and Moring, 1988). Once larval fry emerge from the gravel and begin active feeding, they are referred to as fry. The majority of fry (>95 percent) emerge from redds at night (Gustafson-Marjanen and Dowse, 1983).

When fry reach approximately 4 cm in length, the young salmon are termed parr (Danie *et al.*, 1984). Parr have eight to eleven pigmented vertical bands on their sides that are believed to serve as camouflage (Baum, 1997). A territorial behavior, first apparent during the fry stage, grows more pronounced during the parr stage as the parr actively defend territories (Allen, 1940; Kalleberg, 1958; Danie *et al.*, 1984). Most parr remain in the river for 2 to 3 years before undergoing smoltification, the process in which parr go through physiological changes in order to transition from a freshwater environment to a saltwater marine environment. Some male parr may not go through smoltification and will become sexually mature and participate in spawning with sea-run adult females. These males are referred to as ''precocious parr.''

First year parr are often characterized as being small parr or 0+ parr (4 to 7 cm long), whereas second and third year parr are characterized as large parr (greater than 7 cm long) (Haines, 1992). Parr growth is a function of water temperature (Elliott, 1991), parr density (Randall, 1982), photoperiod (Lundqvist, 1980), interaction with other fish, birds, and mammals (Bjornn and Reiser, 1991), and food supply (Swansburg *et al.*, 2002). Parr movement may be quite limited in the winter (Cunjak, 1988; Heggenes, 1990); however, movement in the winter does occur (Hiscock *et al.*, 2002) and is often necessary, as ice formation reduces total habitat availability (Whalen *et al.*, 1999a). Parr have been documented using riverine, lake, and estuarine habitats; incorporating opportunistic and active feeding strategies; defending territories from competitors including other parr; and working together in small schools to actively pursue prey (Gibson, 1993; Marschall *et al.*, 1998; Pepper, 1976; Pepper *et al.*, 1984; Hutchings, 1986; Erkinaro *et al.*, 1998; Halvorsen and Svenning, 2000; O'Connell and Ash, 1993; Dempson *et al.*, 1996; Klemetsen *et al.*, 2003).

In a parr's second or third spring (age 1 or age 2 respectively), when it has grown to 12.5 to 15 cm in length, a series of physiological, morphological, and behavioral changes occurs (Schaffer and Elson, 1975). This process, called ''smoltification,'' prepares the parr for migration to the ocean and life in salt water. In Maine, the vast majority of naturally reared parr remain in freshwater for 2 years (90 percent or more), with the balance remaining for either 1 or 3 years (USASAC, 2005). In order for parr to undergo smoltification, they must reach a critical size of 10 cm total length at the end of the previous growing season (Hoar, 1988). During the smoltification process, parr markings fade and the body becomes streamlined and silvery with a pronounced fork in the tail. Naturally reared smolts in Maine range in size from 13 to 17 cm, and most smolts enter the sea during May to begin their first ocean migration (USASAC, 2004). During this migration, smolts must contend with changes in salinity, water temperature, pH, dissolved oxygen, pollution levels, and predator assemblages. The physiological changes that occur during smoltification prepare the fish for the dramatic change in osmoregulatory needs that come with the transition from a fresh to a salt water habitat (Ruggles, 1980; Bley, 1987; McCormick and Saunders, 1987; McCormick *et al.*, 1998). Smolts' transition into seawater is usually gradual as they pass through a zone of fresh and saltwater mixing that typically occurs in a river's estuary. Given that smolts undergo smoltification while they are still in the river, they are pre-adapted to make a direct entry into seawater with minimal acclimation (McCormick *et al.*, 1998). This pre-adaptation to seawater is necessary under some circumstances where there is very little transition zone between freshwater and the marine environment.

The spring migration of post-smolts out of the coastal environment is generally rapid, within several tidal cycles, and follows a direct route (Hyvarinen *et al.*, 2006; Lacroix and McCurdy, 1996; Lacroix *et al.*, 2004, 2005). Post-smolts generally travel out of coastal systems on the ebb tide, and may be delayed by flood tides (Hyvarinen *et al.*, 2006; Lacroix and McCurdy, 1996; Lacroix *et al.*, 2004, 2005), though Lacroix and McCurdy (1996) found that post-smolts exhibit active, directed swimming in areas with strong tidal currents. Studies in the Bay of Fundy and Passamaquoddy Bay suggest that post-smolts aggregate together and move near the coast in ''common corridors'' and that post-smolt movement is closely related to surface currents in the bay (Hyvarinen *et al.*, 2006; Lacroix and McCurdy, 1996; Lacroix *et al.*, 2004). European post-smolts tend to use the open ocean for a nursery zone, while North American post-smolts appear to have a more near-shore distribution (Friedland *et al.*, 2003). Post-smolt distribution may reflect water temperatures (Reddin and Shearer, 1987) and/or the major surface-current vectors (Lacroix and Knox, 2005). Post-smolts live mainly on the surface of the water column and form shoals, possibly of fish from the same river (Shelton *et al.*, 1997).

During the late summer/autumn of the first year, North American post-smolts are concentrated in the Labrador Sea and off of the west coast of Greenland, with the highest concentrations between 56° N. and 58° N. (Reddin, 1985; Reddin and Short, 1991; Reddin and Friedland, 1993). The salmon located off Greenland are composed of 1 sea winter (1SW) fish; fish that have spent multiple years at sea (multi-sea winter fish, or MSW); and immature salmon from both North American and European stocks (Reddin, 1988; Reddin *et al.*, 1988). The first winter at sea regulates annual recruitment, and the distribution of winter habitat in the Labrador Sea and Denmark Strait may be critical for North American populations (Friedland *et al.*, 1993). In the spring, North American post-smolts are generally located in the Gulf of St. Lawrence, off the coast of Newfoundland, and on the east coast of the Grand Banks (Reddin, 1985; Dutil and Coutu, 1988; Ritter, 1989; Reddin and Friedland, 1993; Friedland *et al.*, 1999).

Some salmon may remain at sea for another year or more before maturing. After their second winter at sea, the salmon over-winter in the area of the Grand Banks before returning to their natal rivers to spawn (Reddin and Shearer, 1987). Reddin and Friedland (1993) found non-maturing adults located along the coasts of Newfoundland, Labrador, and Greenland, and in the Labrador and Irminger Sea in the later summer/autumn.

Identifying the Geographical Area Occupied by the Species and Specific Areas Within the Geographical Area

To designate critical habitat for Atlantic salmon, as defined under Section 3(5)(A) of the ESA, we must identify specific areas within the geographical area occupied by the species at the time it is listed. The geographic range occupied by the GOM DPS of Atlantic salmon includes historically accessible freshwater habitat ranging from the Androscoggin River watershed in the south to the Dennys River watershed in the north (Fay *et al.*, 2006), as well as the adjacent estuaries and bays through which smolts and adults migrate.

The geographic range occupied by the species extends out to the waters off Canada and Greenland, where post smolts complete their marine migration. However, critical habitat may not be designated within foreign countries or in other areas outside of the jurisdiction of the United States (50 CFR 424.12(h)). Therefore, for the purposes of critical habitat designation, the geographic area occupied by the species will be restricted to areas within the jurisdiction of the United States. This does not diminish the importance of habitat outside of the jurisdiction of the United States for the GOM DPS. In fact, a very significant factor limiting recovery for the species is marine survival, and increasing marine survival is a conservation priority in the recovery of the species. Though marine migration routes and feeding habitat off Canada and Greenland are critical to the survival and recovery of Atlantic salmon, the regulations prohibit designation of these areas as critical habitat. In designating critical habitat for Atlantic salmon, the emphasis is two fold: (1) Assuring that critical habitat essential for a recovered population is protected so that when marine conditions improve, sufficient habitat is available to support recovery; and (2) enacting appropriate management measures to enhance and improve critical habitat areas that are not fully functional because the features have been degraded from anthropogenic causes.

Atlantic salmon are anadromous and spend a portion of life in freshwater and the remaining portion in the marine environment. Therefore, it is conceivable that some freshwater habitat may be vacant for up to 3 years under circumstances where populations are extremely low. While there may be no documented spawning in these areas for that period of time, they would still be considered occupied because salmon at sea would return to these areas to spawn.

Current stock management and assessment efforts also need to be considered in deciding which areas are occupied, including the stocking program managed by USFWS and the Maine Department of Marine Resources (MDMR). Furthermore, in addition to stocking programs, straying from natural populations can result in the occupation of habitat.

Hydrologic Unit Code (HUC) 10 (Level 5 watersheds) described by Seaber *et al.* (1994) are considered the appropriate ''specific areas'' within the geographic area occupied by Atlantic salmon to be examined for the presence of physical or biological features and for the potential need for special management considerations or protections for these features.

The HUC system was developed by the USGS Office of Water Data Coordination in conjunction with the Water Resources Council (Seaber *et al.*, 1994) and provides (1) a nationally accessible, coherent system of water-use data exchange; (2) a means of grouping hydrographical data; and (3) a standardized, scientifically grounded reference system (Laitta *et al.*, 2004). The HUC system currently includes six nationally consistent, hierarchical levels of divisions, with HUC 2 (Level 1) ''Regions'' being the largest (avg. 459,878 sq. km.), and HUC 12 (Level 6) ''sub-watersheds'' being the smallest (avg. 41–163 sq. km.).

The HUC 10 (level 5) watersheds were used to identify ''specific areas'' because this scale accommodates the local adaptation and homing tendencies of Atlantic salmon, and provides a framework in which we can reasonably aggregate occupied river, stream, lake, and estuary habitats that contain the physical and biological features essential to the conservation of the species. Furthermore, many Atlantic salmon populations in the GOM DPS are currently managed at the HUC 10 watershed scale. Therefore, we have a better understanding of the population status and the biology of salmon at the HUC 10 level, whereas less is known at the smaller HUC 12 sub-watershed scale.

Specific areas delineated at the HUC 10 watershed level correspond well to the biology and life history characteristics of Atlantic salmon. Atlantic salmon, like many other anadromous salmonids, exhibit strong homing tendencies (Stabell, 1984). Strong homing tendencies enhance a given individual's chance of spawning with individuals having similar life history characteristics (Dittman and Quinn, 1996) that lead to the evolution and maintenance of local adaptations, and may also enhance their progeny's ability to exploit a given set of resources (Gharrett and Smoker, 1993). Local adaptations allow local populations to survive and reproduce at higher rates than exogenous populations (Reisenbichler, 1988; Tallman and Healey, 1994). Strong homing tendencies have been observed in many Atlantic salmon populations. Stabell (1984) reported that fewer than 3 of every 100 salmon in North America and Europe stray from their natal river. In Maine, Baum and Spencer (1990) reported that 98 percent of hatchery-reared smolts returned to the watershed where they were stocked. Given the strong homing tendencies and life history characteristics of Atlantic salmon (Riddell and Leggett, 1981), we believe that the HUC 10 watershed level accommodates these local adaptations and the biological needs of the species and, therefore, is the most appropriate unit of habitat to delineate ''specific areas'' for consideration as part of the critical habitat designation process.

Within the United States, the freshwater geographic range that the GOM DPS of Atlantic salmon occupies includes perennial river, lake, stream, and estuary habitat connected to the marine environment, ranging from the Androscoggin River watershed to the Dennys River watershed. Within this range, HUC 10 watersheds were considered ''occupied'' if they contained either of the PCEs (*e.g.*, sites for spawning and rearing or sites for migration, described in more detail below) along with the features necessary to support spawning, rearing and/or migration. Additionally, the HUC 10 watershed must meet either of the following criteria. The area is occupied if:

(a) Redds or any life-stage of salmon have been documented in the HUC 10 in the last 6 years, or the HUC 10 is believed to be occupied and contain the PCEs based on the best scientific information available and the best professional judgment of State and Federal biologists; or

(b) The HUC is currently managed by the MDMR and the USFWS through an active stocking program in an effort to enhance or restore Atlantic salmon populations, or the area has been stocked within the last 6 years by MDMR or the USFWS, and juvenile salmon could reasonably be expected to migrate to the marine environment and return to that area as adults and spawn.

One hundred and five HUC 10 watersheds within the Penobscot, Kennebec, Androscoggin, and Downeast

Coastal basins were examined for occupancy based on the above criteria. Eighteen HUCs were determined to be outside the historic range of the species, and subsequently, populations in these HUCs were not included in the GOM DPS in the final listing rule. Though the HUC 10 watersheds outside the historic range of the species were included in the critical habitat biological valuation and economic analysis, since they are not occupied, they were not considered for designation and, therefore, not included in the critical habitat 4(b)(2) exclusion analysis. Of the remaining 86 HUCs in the range of the GOM DPS as defined in the final rule, we concluded that 48 HUC 10 watersheds within the geographic range are occupied by the species at the time of listing. Estuaries and bays within the occupied HUC 10 watersheds within the range of the GOM DPS are also included in the geographic range occupied by the species.

Occupied areas also extend outside the estuary and bays of the GOM DPS as adults return from the marine environment to spawn and smolts migrate towards Greenland for feeding. We are not able at this time to identify the specific features characteristic of marine migration and feeding habitat within waters under U.S. jurisdiction essential to the conservation of Atlantic salmon and are, therefore, unable to identify the specific areas where such features exist. Therefore, specific areas of marine habitat are not designated as critical habitat.

Physical and Biological Features in Freshwater and Estuary Specific Areas Essential to the Conservation of the Species

We identify the physical and biological features essential for the conservation of Atlantic salmon that are found within the specific occupied areas identified in the previous section. To determine which features are essential to the conservation of the GOM DPS of Atlantic salmon, we first define what conservation means for this species. Conservation is defined in the ESA as using all methods and procedures which are necessary to bring any endangered or threatened species to the point at which the measures provided by the ESA are no longer necessary. Conservation, therefore, describes those activities and efforts undertaken to achieve recovery. For the GOM DPS, we have determined that the successful return of adult salmon to spawning habitat, spawning, egg incubation and hatching, juvenile survival during the rearing time in freshwater, and smolt migration out of the rivers to the ocean are all essential to the conservation of Atlantic salmon. Therefore, we identify features essential to successful completion of these life cycle activities. Although successful marine migration is also essential to the conservation of the species, we are not able to identify the essential features of marine migration and feeding habitat at this time. Therefore, as noted above, marine habitat areas are not designated as critical habitat.

Within the occupied range of the Gulf of Maine DPS, Atlantic salmon PCEs include sites for spawning and incubation, sites for juvenile rearing, and sites for migration. The physical and biological features of the PCEs that allow these sites to be used successfully for spawning, incubation, rearing, and migration are the features of habitat within the GOM DPS that are essential to the conservation of the species. A detailed review of the physical and biological features required by Atlantic salmon is provided in Kircheis and Liebich (2007). As stated above, Atlantic salmon also use marine sites for growth and migration; however, we did not identify critical habitat within the marine environment because the specific physical and biological features of marine habitat that are essential for the conservation of the GOM DPS (and the specific areas on which these features might be found) cannot be identified. Unlike Pacific salmonids, some of which use near-shore marine environments for juvenile feeding and growth, Atlantic salmon migrate through the near-shore marine areas quickly during the month of May and early June. We have limited knowledge of the physical and biological features that the species uses in the marine environment. However, we have very little information on the specifics of these physical and biological features and how they may require special management considerations or protection. Therefore, we cannot accurately identify the specific areas where these features exist or what types of management considerations or protections may be necessary to protect these physical and biological features during the migration period.

Detailed habitat surveys have been conducted in some areas within the range of the GOM DPS of Atlantic salmon, providing clear estimates of and distinctions between those sites most suited for spawning and incubation and those sites most used for juvenile rearing. These surveys are most complete for seven coastal watersheds: Dennys, East Machias, Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot watersheds; and portions of the Penobscot Basin, including portions of the East Branch Penobscot, portions of the Piscataquis and Mattawamkeag, Kenduskeag Stream, Marsh Stream, and Cove Brook; and portions of the Kennebec Basin, including a portion of the lower mainstem around the site of the old Edwards Dam and portions of the Sandy River. Throughout most of the range of the GOM DPS, however, this level of survey has not been conducted, and, therefore, this level of detail is not available.

In order to determine habitat quantity for each HUC 10 we relied on a GIS based habitat prediction model (See appendix C of NMFS, 2009a). The model was developed using data from existing habitat surveys conducted in the Machias, Sheepscot, Dennys, Sandy, Piscataquis, Mattawamkeag, and Souadabscook Rivers. A combination of reach slope (change in elevation of a stream segment) derived from contour and digital elevation model (DEM) datasets, cumulative drainage area, and physiographic province were used to predict the total amount of rearing habitat within a reach. These features help to reveal stream segments with gradients that would likely represent areas of riffles or fast moving water, habitat most frequently used for spawning and rearing of Atlantic salmon. The variables included in the model accurately predict the presence of rearing habitat approximately 75 percent of the time. We relied on the model to generate the habitat quantity present within each HUC 10 to provide consistent data across the range of the entire DPS and on existing habitat surveys to validate the output of the model.

Although we have found the model to be nearly 75 percent accurate in predicting the presence of sites for spawning and rearing within specific areas, and we have an abundance of institutional knowledge on the physical and biological features that distinguish sites for spawning and sites for rearing, the model cannot be used to distinguish between sites for spawning and sites for rearing across the entire geographic range. This is because: (1) Sites used for spawning are also used for rearing; and (2) the model is unable to identify substrate features most frequently used for spawning activity, but rather uses landscape features to identify where stream gradient conducive to both spawning and rearing activity exists. As such, we have chosen to group sites for spawning and sites for rearing into one PCE. Therefore, sites for spawning and sites for rearing are discussed together throughout this analysis as sites for spawning and rearing.

In the section below, we identify the essential physical and biological features of spawning and rearing sites and migration sites found in the occupied areas described in the previous section.

(A) Physical and Biological Features of the Spawning and Rearing PCE

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.* Adult salmon can arrive at spawning grounds several months in advance of spawning activity. Adults that arrive early require holding areas in freshwater and estuarine areas that provide shade, protection from predators, and protection from other environmental variables such as high flows, high temperatures, and sedimentation. Early migration is an adaptive trait that ensures adults sufficient time to reach spawning areas despite the occurrence of temporarily unfavorable conditions that occur naturally (Bjornn and Reiser, 1991). Salmon that return in early spring spend nearly 5 months in the river before spawning; often seeking cool water refuge (*e.g.*, deep pools, springs, and mouths of smaller tributaries) during the summer months. Large boulders or rocks, over-hanging trees, logs, woody debris, submerged vegetation, and undercut banks provide shade, reduce velocities needed for resting, and offer protection from predators (Giger, 1973). These features are essential to the conservation of the species to help ensure the survival and successful spawning of adult salmon.

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.* Spawning activity in the Gulf of Maine DPS of Atlantic salmon typically occurs between mid-October and mid-November (Baum, 1997) and is believed to be triggered by a combination of water temperature and photoperiod (Bjornn and Reiser, 1991). Water quantity and quality, as well as substrate type, are important for successful Atlantic salmon spawning. Water quantity can determine habitat availability, and water quality may influence spawning success. Substrate often determines where spawning occurs, and cover can influence survival rates of both adults and newly hatched salmon.

Preferred spawning habitat contains gravel substrate with adequate water circulation to keep buried eggs well oxygenated (Peterson, 1978). Eggs in a redd are entirely dependent upon sub-surface movement of water to provide adequate oxygen for survival and growth (Decola, 1970). Water velocity and permeability of substrate allow for adequate transport of well-oxygenated water for egg respiration (Wickett, 1954) and removal of metabolic waste that may accumulate in the redd during egg development (Decola, 1970; Jordan and Beland, 1981). Substrate permeability as deep as the egg pit throughout the incubation period is important because eggs are typically deposited at the bottom of the egg pit.

Dissolved oxygen (DO) content is important for proper embryonic development and hatching. Embryos can survive when DO concentrations are below saturation levels, but their development is often subnormal due to delayed growth and maturation, performance, or delayed hatching (Doudoroff and Warren, 1965). In addition, embryos consume more oxygen (*i.e.*, the metabolism of the embryo increases) when temperature increases (Decola, 1970). An increase in water temperature, however, decreases the amount of oxygen that the water can hold. During the embryonic stage when tissue and organs are developing and the demand for oxygen is quite high, embryos can only tolerate a narrow range of temperatures. These sites are essential for the conservation of the species because, without them, embryo development would not be successful.

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.* The period of emergence and the establishment of feeding territories is a critical period in the salmon life cycle since at this time mortality can be very high. When fry leave the redd, they emerge through the interstitial spaces in the gravel to reach the surface. When the interstitial spaces become embedded with fine organic material or fine sand, emergence can be significantly impeded or prevented. Newly emerged fry prefer shallow, low velocity, riffle habitat with a clean gravel substrate. Territories are quickly established by seeking out areas of low velocities that occur in eddies in front of or behind larger particles that are embedded in areas of higher velocities to maximize drift of prey sources (Armstrong *et al.*, 2002). Once a territory has been established, fry use a sit-and-wait strategy, feeding opportunistically on invertebrate drift. This strategy enables the fish to minimize energy expenditure while maximizing energy intake (Bachman, 1984). These sites are essential for the conservation of the species because, without them, fry emergence would not be successful.

4. *Freshwater rearing sites with space to accommodate growth and survival of Atlantic salmon parr.* When fry reach approximately 4 cm in length, the young salmon are termed parr (Danie *et al.*, 1984). The habitat in Maine rivers currently supports on average between five and ten large parr (age 1 or older) per 100 square meters of habitat, or one habitat unit (Elson, 1975; Baum, 1997). The amount of space available for juvenile salmon occupancy is a function of biotic and abiotic habitat features, including stream morphology, substrate, gradient, and cover; the availability and abundance of food; and the makeup of predators and competitors (Bjornn and Reiser, 1991). Further limiting the amount of space available to parr is their strong territorial instinct. Parr actively defend territories against other fish, including other parr, to maximize their opportunity to capture prey items. The size of the territory that a parr will defend is a function of the size and density of parr, food availability, the size and roughness of the substrate, and current velocity (Kalleberg, 1958; Grant *et al.*, 1998). The amount of space needed by an individual increases with age and size (Bjornn and Reiser, 1991). Cover, including undercut banks, overhanging trees and vegetation, diverse substrates and depths, and some types of aquatic vegetation, can make habitat suitable for occupancy (Bjornn and Reiser, 1991). Cover can provide a buffer against extreme temperatures; protection from predators; increased food abundance; and protection from environmental variables such as high flow events and sedimentation. These features are essential to the conservation of the species because, without them, juvenile salmon would have limited areas for foraging and protection from predators.

5. *Freshwater rearing sites with a combination of river, stream, and lake habitats that accommodate parr's ability to occupy many niches and maximize parr production.* Parr prefer, but are not limited to, riffle habitat associated with diverse rough gravel substrate. The preference for these habitats by parr that use river and stream habitats supports a sit-and-wait feeding strategy intended to minimize energy expenditure while maximizing growth. Overall, large Atlantic salmon parr using river and stream habitats select for diverse substrates that predominately consist of boulder and cobble (Symons and

Heland, 1978; Heggenes, 1990; Heggenes *et al.*, 1999).

Parr can also move great distances into or out of tributaries and mainstems to seek out habitat that is more conducive to growth and survival (McCormick *et al.*, 1998). This occurs most frequently as parr grow and they move from their natal spawning grounds to areas that have much rougher substrate, providing more suitable over-wintering habitat and more food organisms (McCormick *et al.*, 1998). In the fall, large parr that are likely to become smolts the following spring have been documented leaving summer rearing areas in some head-water tributaries and migrating downstream, though not necessarily entering the estuary or marine environment (McCormick *et al.*, 1998).

Though parr are typically stream dwellers, they also use pools within rivers and streams, dead-waters (sections of river or stream with very little to no gradient), and lakes within a river system as a secondary nursery area after emergence (Cunjak, 1996; Morantz *et al.*, 1987; Erkinaro *et al.*, 1998). It is known that parr will use pool habitats during periods of low water, most likely as refuge from high temperatures (McCormick *et al.*, 1998) and during the winter months to minimize energy expenditure and avoid areas that are prone to freezing or de-watering (Rimmer *et al.*, 1984). Salmon parr may also spend weeks or months in the estuary during the summer (Cunjak *et al.*, 1989, 1990; Power and Shooner, 1966). These areas are essential to the conservation of the species to ensure survival and species persistence when particular habitats become less suitable or unsuitable for survival during periods of extreme conditions such as extreme high temperatures, extreme low temperatures, and droughts.

6. *Freshwater rearing sites with cool, oxygenated water to support growth and survival of Atlantic salmon parr*. Atlantic salmon are cold water fish and have a thermal tolerance zone where activity and growth is optimal (Decola, 1970). Small parr and large parr have similar temperature tolerances (Elliott, 1991). Water temperature influences growth, survival, and behavior of juvenile Atlantic salmon. Juvenile salmon can be exposed to very warm temperatures (> 20 °C) in the summer and near freezing temperatures in the winter, and have evolved with a series of physiological and behavioral strategies that enables them to adapt to the wide range of thermal conditions that they may encounter. Parr's optimal temperature for feeding and growth ranges from 15 ° to 19 °C (Decola, 1970). When water temperatures surpass 19 °C, feeding and behavioral activities are directed towards maintenance and survival. During the winter when temperatures approach freezing, parr reduce energy expenditures by spending less time defending territories, feeding less, and moving into slower velocity microhabitats (Cunjak, 1996).

Oxygen consumption by parr is a function of temperature. As temperature increases, the demand for oxygen increases (Decola, 1970). Parr require highly oxygenated waters to support their active feeding strategy. Though salmon parr can tolerate oxygen levels below 6mg/l, both swimming activity and growth rates are restricted. These features are essential to the conservation of the species because high and low water temperatures and low oxygen concentrations can result in the cessation of feeding activities necessary for juvenile growth and survival and can result in direct mortality.

7. *Freshwater rearing sites with diverse food resources to support growth and survival of Atlantic salmon parr*. Atlantic salmon require sufficient energy to meet their basic metabolic needs for growth and reproduction (Spence *et al.*, 1996). Parr largely depend on invertebrate drift for foraging, and actively defend territories to assure adequate food resources needed for growth. Parr feed on larvae of mayflies, stoneflies, chironomids, caddisflies, blackflies, aquatic annelids, and mollusks, as well as numerous terrestrial invertebrates that fall into the river (Scott and Crossman, 1973; Nislow *et al.*, 1999). As parr grow, they will occasionally eat small fishes, such as alewives, dace, or minnows (Baum, 1997).

Atlantic salmon attain energy from food sources that originate from both allochthonous (outside the stream) and autochthonous (within the stream) sources. What food is available to parr and how food is obtained is a function of a river's hydrology, geomorphology, biology, water quality, and connectivity (Annear *et al.*, 2004). The riparian zone is a fundamental component to both watershed and ecosystem function, as it provides critical physical and biological linkages between terrestrial and aquatic environments (Gregory *et al.*, 1991). Flooding of the riparian zone is an important mechanism needed to support the lateral transport of nutrients from the floodplain back to the river (Annear *et al.*, 2004). Lateral transport of nutrients and organic matter from the riparian zone to the river supports the growth of plant, plankton, and invertebrate communities. Stream invertebrates are the principle linkage between the primary producers and higher trophic levels, including salmon parr. These features are essential to the conservation of the species, as parr require these food items for growth and survival.

(B) Physical and Biological Features of the Migration PCE

1. *Freshwater and estuary migratory sites free from physical and biological barriers that delay or prevent access of adult salmon seeking spawning grounds needed to support recovered populations*. Adult Atlantic salmon returning to their natal rivers or streams require migration sites free from barriers that obstruct or delay passage to reach their spawning grounds at the proper time for effective spawning (Bjornn and Reiser, 1991). Physical and biological barriers within migration sites can prevent adult salmon from effectively spawning either by preventing access to spawning habitat or impairing a fish's ability to spawn effectively by delaying migration or impairing the health of the fish. Migration sites free from physical and biological barriers are essential to the conservation of the species because, without them, adult Atlantic salmon would not be able to access spawning grounds needed for egg deposition and embryo development.

2. *Freshwater and estuary migration sites with pool, lake, and instream 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 salmon*. Atlantic salmon may travel as far as 965 km upstream to spawn (NEFMC, 1998). During migration, adult salmon require holding and resting areas that provide the necessary cover, temperature, flow, and water quality conditions needed to survive. Holding areas can include areas in rivers and streams, lakes, ponds, and even the ocean (Bjornn and Reiser, 1991). Holding areas are necessary below temporary seasonal migration barriers such as those created by flow, temperature, turbidity, and temporary obstructions such as debris jams and beaver dams, and adjacent to spawning areas. Adult salmon can become fatigued when ascending high velocity riffles or falls and require resting areas within and around high velocity waters where they can recover until they are able to continue their migration. Holding areas near spawning areas are necessary when upstream migration is not delayed and adults reach spawning areas before they are ready to spawn. These features are essential to the conservation of the species because,

without them, adult Atlantic salmon would be subject to fatigue, predation, and mortality from exposure to unfavorable conditions, significantly reducing spawning success.

3. *Freshwater and estuary migration sites with abundant, diverse native fish communities to serve as a protective buffer against predation.* Adult Atlantic salmon and Atlantic salmon smolts interact with other diadromous species indirectly. Adult and smolt migration through the estuary often coincides with the presence of alewives (*Alosa* spp.), American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), and striped bass (*Morone saxatilis*). The abundance of diadromous species present during adult migration may serve as an alternative prey source for seals, porpoises and otters (Saunders *et al.*, 2006). As an example, pre-spawned adult shad enter rivers and begin their upstream spawning migration at approximately the same time as early migrating adult salmon (Fay *et al.*, 2006). Historically, shad runs were considerably larger than salmon runs (Atkins and Foster, 1867; Stevenson, 1898). Thus, native predators of medium to large size fish in the estuarine and lower river zones could have preyed on these 1.5 to 2.5 kg size fish readily (Fay *et al.*, 2006; Saunders *et al.*, 2006). In the absence or reduced abundance of these diadromous fish communities, it would be expected that Atlantic salmon will likely become increasingly targeted as forage by large predators (Saunders *et al.*, 2006).

As Atlantic salmon smolts pass through the estuary during migration from their freshwater rearing sites to the marine environment, they experience high levels of predation. Predation rates through the estuary often result in up to 50 percent mortality during this transition period between freshwater to the marine environment (Larsson, 1985). There is, however, large annual variation in estuarine mortality, which is believed to be dependent upon the abundance and availability of other prey items including alewives, blueback herring, and American shad, as well as the spatial and temporal distribution and abundance of predators (Anthony, 1994).

The presence and absence of co-evolutionary diadromous species such as alewives, blueback herring, and American shad likely play an important role in mitigating the magnitude of predation on smolts from predators such as striped bass, double-crested cormorants (*Phalacrocorax auritus*), and ospreys (*Pandion haliaetus*). The migration time of pre-spawned adult alewives overlaps in time and space with the migration of Atlantic salmon smolts (Saunders *et al.*, 2006). Given that when alewife populations are robust, alewife numbers not only likely greatly exceed densities of Atlantic salmon smolts, making them more available to predators, but the caloric content per individual alewife is greater than that of an Atlantic salmon smolt (Schulze, 1996), likely making the alewife a more desirable prey species (Saunders *et al.*, 2006). These features are essential to the conservation of the species because, without highly prolific abundant alternate prey species such as alewives and shad, the less prolific Atlantic salmon will likely become a preferred prey species.

4. *Freshwater and estuary migration sites free from physical and biological barriers that delay or prevent emigration of smolts to the marine environment.* Atlantic salmon smolts require an open migration corridor from their juvenile rearing habitat to the marine environment. Seaward migration of smolts is initiated by increases in river flow and temperature in the early spring (McCleave, 1978; Thorpe and Morgan, 1978). Migration through the estuary is believed to be the most challenging period for smolts (Lacroix and McCurdy, 1996). Although it is difficult to generalize migration trends because of the variety of estuaries, Atlantic salmon post-smolts tend to move quickly through the estuary and enter the ocean within a few days or less (Lacroix *et al.,* 2004; Hyvarinen *et al.,* 2006; McCleave, 1978). In the upper estuary, where river flow is strong, Atlantic salmon smolts use passive drift to travel (Moore *et al.,* 1995; Fried *et al.,* 1978; LaBar *et al.,* 1978). In the lower estuary smolts display active swimming, although their movement is influenced by currents and tides (Lacroix and McCurdy, 1996; Moore *et al.,* 1995; Holm *et al.,* 1982; Fried *et al.,* 1978). In addition, although some individuals seem to utilize a period of saltwater acclimation, some fish have no apparent period of acclimation (Lacroix *et al.,* 2004). Stefansson *et al.* (2003) found that post-smolts adapt to seawater without any long-term physiological impairment. Several studies also suggest that there is a ''survival window'' which is open for several weeks in the spring, and gradually closes through the summer, during which time salmon can migrate more successfully (Larsson, 1977; Hansen and Jonsson, 1989; Hansen and Quinn, 1998). These features are essential to the conservation of the species because a delay in migration of smolts can result in the loss of the smolts' ability to osmoregulate in the marine environment, a necessary adaptation for smolt survival.

5. *Freshwater and estuary migration sites with sufficiently cool water temperatures and water flows that coincide with diurnal cues to stimulate smolt migration.* The process of smoltification is triggered in response to environmental cues. Photoperiod and temperature have the greatest influence on regulating the smolting process. Increase in day length is necessary for smolting to occur (Duston and Saunders, 1990). McCormick *et al.,* (1999) noted that in spite of wide temperature variations among rivers throughout New England, almost all smolt migrations begin around the first of May and are nearly complete by the first week in June. However, the time that it takes for the smoltification process to be completed appears to be closely related to water temperature. When water temperatures increase, the smolting process is advanced, evident by increases in Na+, K+-ATPase activity—the rate of exchange of sodium (Na+) and potassium (K+) ions across the gill membrane or the regulation of salts that allow smolts to survive in the marine environment (Johnston and Saunders, 1981; McCormick *et al.*, 1998; McCormick *et al.*, 2002). In addition to playing a role in regulating the smoltification process, high temperatures also are responsible for the cessation of Na+, K+-ATPase activity of smolts, limiting their ability to excrete excess salts when they enter the marine environment. McCormick *et al.* (1999) found significant decreases in Na+, K+-ATPase activity in smolts at the end of the migration period, but also found that smolts in warmer rivers had reductions in Na+, K+-ATPase activity earlier than smolts found in colder rivers. Hence any delay of migration has the potential to reduce survival of out-migrating smolts because as water temperatures rise over the spring migration period, smolts experience a reduction in Na+, K+-ATPase, reducing their ability to regulate salts as they enter the marine environment. Though flow does not appear to play a role in the smoltification process, flow does appear to play an important role in stimulating a migration response (Whalen *et al.,*, 1999b). Whalen *et al.* (1999b) recorded that there was no apparent downstream migration following a high flow event in mid-to late April in a Vermont river when water temperatures were between 3 and 6 °C; however, when water temperatures reached 8 to 12 °C, small peaks in discharge resulted in corresponding increases in smolt migration. These features are essential

to the conservation of the species because elevated water temperatures that occur in advance of a smolt's diurnal cues to migrate can result in a decreased migration window in which smolts are capable of transitioning into the marine environment. A decrease in the migration window has the potential to reduce survival of smolts especially for fish with greater migration distances.

6. *Freshwater migration sites with water chemistry needed to support sea water adaptation of smolts.* The effects of acidity on Atlantic salmon have been well documented. The effects of acidity cause ionoregulatory failure in Atlantic salmon smolts while in freshwater (Rosseland and Skogheim, 1984; Farmer *et al.*, 1989; Staurnes *et al.*, 1993, 1996). This inhibition of gill Na+, K+-ATPase activity can cause the loss of plasma ions and may result in reduced seawater tolerance (Rosseland and Skogheim, 1984; Farmer *et al.*, 1989; Staurnes *et al.*, 1993, 1996) and increased cardiovascular disturbances (Milligan and Wood, 1982; Brodeur *et al.*, 1999). Parr undergoing parr/smolt transformation become more sensitive to acidic water, hence, water chemistry that is not normally regarded as toxic to other salmonids may be toxic to smolts (Staurnes *et al.*, 1993, 1995). This is true even in rivers that are not chronically acidic and not normally considered as being in danger of acidification (Staurnes *et al.*, 1993, 1995). Atlantic salmon smolts are most vulnerable to low pH in combination with elevated levels of monomeric labile species of aluminum (aluminum capable of being absorbed across the gill membrane) and low calcium (Rosseland and Skogheim, 1984; Rosseland *et al.*, 1990; Kroglund and Staurnes, 1999). These features are essential to the conservation of the species because Atlantic salmon smolts exposed to acidic waters can lose sea water tolerance, which can result in direct mortality or indirect mortality from altered behavior and fitness.

Special Management Considerations or Protections

Specific areas within the geographic area occupied by a species may be designated as critical habitat only if they contain physical or biological features essential to the conservation of the species that "may require special management considerations or protection." It is the features and not the specific areas that are the focus of the "may require" provision. Use of the disjunctive "or" also suggests the need to give distinct meaning to the terms "special management considerations" and "protection." "Protection" suggests actions to address a negative impact. "Management" seems broader than protection, and could include active manipulation of the feature or aspects of the environment. The ESA regulations at 50 CFR 424.02(j) further define special management considerations as "any methods or procedures useful in protecting physical and biological features of the environment for the conservation of listed species." The term "may" was the focus of two Federal district courts that ruled that features can meet this provision because of either a present requirement for special management considerations or protection or possible future requirements (see *Center for Biol. Diversity* v. *Norton*, 240 F. Supp. 2d 1090 (D. Ariz. 2003); *Cape Hatteras Access Preservation Alliance* v. *DOI*, 344 F. Supp. 2d 108 (D.D.C. 2004)). The Arizona district court ruled that the provision cannot be interpreted to mean that features already covered by an existing management plan must be determined to require additional special management, because the term additional is not in the statute. Rather, the court ruled that the existence of management plans may be evidence that the features in fact require special management (*Center for Biol. Diversity* v. *Norton*, 240 F. Supp. 2d at 1096–1100). The need for special management considerations or protection need not be immediate, but it is required that the specific area designated have features which, in the future, may require special consideration or protection (*Cape Hatteras,* 344 F. Supp. 2d at 123–124).

The primary impacts of critical habitat designation result from the consultation requirements of ESA section 7(a)(2). Federal agencies must consult with NMFS to ensure that their actions are not likely to result in the destruction or adverse modification of critical habitat (or jeopardize the species' continued existence). These impacts are attributed only to the designation (*i.e.*, are incremental impacts of the designation) if Federal agencies modify their proposed actions to ensure they are not likely to destroy or adversely modify the critical habitat beyond any modifications they would make because of listing and the requirement to avoid jeopardy. Incremental impacts of designation include State and local protections that may be triggered as a result of designation and education of the public about the importance of an area for species conservation. When a modification is required due to impacts both to the species and critical habitat, the impact of the designation is considered to be co-extensive with ESA listing of the species. The ESA 4(b)(2) Report (NMFS, 2009b) and Economic Analysis (IEc, 2009a) describe the impacts in detail. These reports identify and describe potential future Federal activities that would trigger section 7 consultation requirements because they may affect the essential physical and biological features.

We identified a number of activities and associated threats that may affect the PCEs and associated physical and biological features essential to the conservation of Atlantic salmon within the occupied range of the GOM DPS. These activities, which include agriculture, forestry, changing land-use and development, hatcheries and stocking, roads and road crossings, mining, dams, dredging, and aquaculture have the potential to reduce the quality and quantity of the PCEs and their associated physical and biological features. There are other threats to Atlantic salmon habitat, including acidification of surface waters. However, we are not able to clearly separate out the specific activities responsible for acidification, and therefore, are unable to specifically identify a Federal nexus.

TABLE 1—SPECIFIC AREAS WITHIN THE GEOGRAPHIC AREA OCCUPIED BY A SPECIES AND THE ASSOCIATED SPECIAL MANAGEMENT CONSIDERATIONS OR PROTECTIONS THAT MAY BE REQUIRED

HUC code	Watershed name	Special management considerations*
105000205	Machias River	A F C/L H/S R Da Dr
105000204	East Machias River	A F C/L H/S R M Da Dr
105000208	Pleasant River	A F C/L H/S R M Da Dr
105000201	Dennys River	A F C/L H/S R M Da Dr
105000207	Chandler River	A F C/L H/S R M Da Dr
105000209	Narraguagus River	A F C/L H/S R M Da Dr
105000213	Union River Bay	A F C/L H/S R M Da Dr Q

TABLE 1—SPECIFIC AREAS WITHIN THE GEOGRAPHIC AREA OCCUPIED BY A SPECIES AND THE ASSOCIATED SPECIAL MANAGEMENT CONSIDERATIONS OR PROTECTIONS THAT MAY BE REQUIRED—Continued

HUC code	Watershed name	Special management considerations*
105000203	Grand Manan Channel	A F C/L H/S R M Da Dr Q
105000206	Roque Bluffs Coastal	A F C/L H/S R M Da Dr
105000210	Tunk Stream	A F C/L H/S R Da Dr
105000212	Graham Lake	A F C/L H/S R M Da
102000202	Grand Lake Matagamon	A F C/L H/S R Da
102000203	East Branch Penobscot River	A F C/L H/S R
102000204	Seboeis River	A F C/L H/S R Da
102000205	East Branch Penobscot River	A F C/L H/S R Da
102000301	West Branch Mattawamkeag River	A F C/L H/S R M Da
102000302	East Branch Mattawamkeag River	A F C/L H/S R M
102000303	Mattawamkeag River	A F C/L H/S R M
102000305	Mattawamkeag River	A F C/L H/S R M
102000306	Molunkus Stream	A F C/L H/S R
102000307	Mattawamkeag River	A F C/L H/S R M Da
102000401	Piscataquis River	A F C/L H/S R Da
102000402	Piscataquis River	A F C/L H/S R M Da
102000404	Pleasant River	A F C/L H/S R Da
102000405	Seboeis Stream	A F C/L H/S R Da
102000406	Piscataquis River	A F C/L H/S R M Da
102000501	Penobscot River at Mattawamkeag	A F C/L H/S M Da
102000502	Penobscot River at West Enfield	A F C/L H/S R M Da
102000503	Passadumkeag River	A F C/L H/S R M Da
102000505	Sunkhaze Stream	A F C/L H/S R
102000506	Penobscot River at Orson Island	A F C/L H/S R M
102000507	Birch Stream	A F C/L H/S R M
102000509	Penobscot River at Veazie Dam	A F C/L H/S R M Da
102000510	Kenduskeag Stream	A F C/L H/S R M Da Dr
102000511	Souadabscook Stream	A F C/L H/S R M Da Dr
102000512	Marsh River	A F C/L H/S M Da Dr
102000513	Penobscot River	A F C/L H/S R M Da Dr
105000218	Belfast Bay	A F C/L H/S R M Da Dr
105000219	Ducktrap River	A F C/L H/S R Da Dr Q
105000301	St. George River	A F C/L H/S R M Da Dr
105000302	Medomak River	A F C/L H/S R M Da Dr
105000305	Sheepscot River	A F C/L H/S R M Da Dr
103000306	Kennebec River at Waterville Dam	A F C/L H/S R M Da Dr
103000305	Sandy River	A F C/L H/S R M Da Dr
103000312	Kennebec at Merrymeeting Bay	A F C/L H/S R M Da Dr
105000306	Sheepscot Bay	A F C/L H/S R M Da Dr
105000307	Kennebec River Estuary	A F C/L H/S R M Da Dr
104000210	Little Androscoggin River	A F C/L H/S R M Da Dr

*A = Agriculture; F = Forestry; C/L = Changing Land Use; H/S = Hatcheries and Stocking; R = Roads and Road Crossings; M = Mining; Da = Dams; Dr = Dredging; Q = Aquaculture.

*''Specific Areas Outside the Geographical Area Occupied by the Species * * * Essential to the Conservation of the Species''*

Section 3(5)(A)(ii) of the ESA further defines ''critical habitat'' as ''specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of [section 4 of this Act], upon a determination by the Secretary that such areas are essential for the conservation of the species.'' For the reasons stated above in the discussion of specific occupied areas, we delineated the specific areas outside the geographic area occupied by the species using HUC 10 (level 5) watersheds. To determine whether these unoccupied areas are essential for the conservation of the species, we: (1) established recovery criteria to determine when the species no longer warrants the protections of the ESA (See NMFS, 2009a (Appendix A)) and the amount of habitat needed to support the recovered population; and (2) determined the amount of habitat currently occupied by the species relative to the amount of habitat necessary to achieve recovery.

In developing recovery criteria, we employed a strategy of identifying both geographic and population level criteria, that, if met would protect the DPS from demographic and environmental variation to the extent in which the population would no longer require protection under the ESA. Geographic criteria were established to assure that Atlantic salmon are well distributed across the range of the DPS to accommodate the metapopulation characteristics of Atlantic salmon. Atlantic salmon have strong homing characteristics that allow local breeding populations to become well adapted to a particular environment. At the same time, limited straying does occur among salmon populations assuring population diversity through exchange of some genes between populations, and allowing for population expansion and recolonization of extirpated populations. To accommodate these life history characteristics, we established a geographic framework represented by three Salmon Habitat Recovery Units, or SHRUs, within the DPS (see NMFS, 2009a (appendix A)) that would, we believe, be reasonably protective of these life history characteristics and to ensure that Atlantic salmon are widely distributed across the range of the DPS to provide protection from demographic and environmental variation. As explained in more detail in the

Recovery Criteria (NMFS, 2009a (Appendix A)), we determined that all three SHRUs must fulfill the criteria described below for the overall species, the GOM DPS, to be considered recovered.

Criteria

Population level criteria were established to assure that a recovered population is likely to be sufficiently robust to withstand natural demographic variability (*e.g.*, periods of low marine survival) and not likely to become an endangered species in the foreseeable future. We concluded that a census population of 500 adult returns (assuming a 1:1 sex ratio) in each SHRU is to be used as a benchmark to evaluate the population as either recovered or one that requires protection under the ESA. Franklin (1980) introduced 500 as the approximate effective population size necessary to retain sufficient genetic variation and long term persistence of a population.

We have chosen to use a census population (N) (the actual count of adult returns) of 500 adult returns in each SHRU to serve as a benchmark to evaluate the population as either recovered or one that requires protection under the ESA. We used the census number rather than an effective population size for four reasons: (1) The adult census through redd counts or trap catches have been used as the principal indicator of population health in the GOM DPS since Charles Atkins first started estimating returns in the mid to late 1800s. At this time, there are not sufficient resources or time to fully assess the effective population size of the entire Gulf of Maine DPS on an annual basis, whereas sufficient resources are already in place to reasonably assess the census population; (2) a census population of 500 adults per SHRU provides a starting point only for establishing criteria for delisting and does not represent the actual number at which the population warrants delisting. Other pre-decision criteria must also be met for delisting as described in the following paragraph: (3) Atlantic salmon have tremendously complex life histories allowing for great opportunity for extensive cross generational breeding. This is because of salmon's iteroparity and because precocious parr, one-sea winter and multi-sea winter fish can all participate in spawning activity. Having multi-generational participation in spawning activity significantly reduces the effective population to census population ratio, but furthermore, makes determining the actual N_e/N ratios extremely difficult and highly debatable for the natural population; (4) Though there has been much debate in the literature regarding the application of assigning a general number to represent when populations are sufficiently large enough to maintain genetic variation (Allendorf and Luikart, 2007; Waples & Yokota, 2007; Reiman & Allendorf, 2001), the 500 rule introduced by Franklin (1980) has not been superseded by any other rule and does serve as useful guidance for indicating when a population may be at risk of losing genetic variability (Allendorf and Luikart, 2007).

To evaluate recovery of the GOM DPS, we have determined that five criteria must be met: (1) The adult spawner population of each SHRU must be 500 or greater in an effort to maintain sufficient genetic variability within the population for long-term persistence. This is to be determined or estimated through adults observed at trapping facilities or redd counts; (2) The GOM DPS must demonstrate self-sustaining persistence where each SHRU has less than a 50 percent probability of falling below 500 adult spawners in the next 15 years based on PVA projections described above. The 50 percent assurance threshold satisfies the criterion that the population is ''not likely'' to become an endangered species; while 15 years represents the ''foreseeable future'' for which we have determined that we can make reasonable projections based on past demographic data available to us; (3) The entire GOM DPS must demonstrate consistent positive population growth for at least two generations (10 years) before the decision to delist is made. Ten years of pre-decision data that reflects positive population trends provides some assurance that recent population increases are not happenstance but more likely a reflection of sustainable positive population growth; (4) A recovered GOM DPS must represent the natural population (*i.e.*, adult returns must originate from natural reproduction that has occurred in the wild); hatchery product cannot be counted towards recovery because a population reliant upon hatchery product for sustainability is indicative of a population that continues to be at risk; (5) In order to delist the GOM DPS, the threats identified at the time of listing must be addressed through regulatory or any other means. These threats are identified in the factors specified under section 4(a)(1) of the ESA as described in the 2006 Status Review (Fay *et al.*, 2006). Methods to address these threats will be addressed in a final recovery plan for the expanded GOM DPS.

After determining criteria for delisting, we applied these criteria to assess the number of adult spawners that would be needed to weather a downturn in survival as experienced between the years of 1991 and 2006, a period of exceptionally low survival. Using demographic data for this time period we applied the criteria described above in conjunction with a PVA to determine how many adults would be required in each SHRU to weather a similar downturn in survival while having a greater than 50 percent chance of remaining above 500 adults (see NMFS, 2009a (Appendix B)). This analysis projected that a census population of 2,000 spawners (1000 male and 1000 female) would be needed in each of the three SHRUs for the GOM DPS to weather a downturn in survival such as experienced over the time period from 1991–2006. Based on this analysis, we conclude that enough habitat is needed in each of the three SHRUs to support the offspring of these 2,000 adult spawners. Using an average fecundity per female of 7,200 eggs (Legault, 2004), and male to female ratio of 1:1, or 1000 females, and a target number of eggs per one unit of habitat ($100m^2$) of 240 (Baum, 1997), we determined that 30,000 units of habitat are needed across each SHRU (7,200 eggs × 1000 females/240 eggs = 30,000) to support the offspring of 2,000 spawners, which represents the quantity of habitat in each SHRU essential to the conservation of the species (NMFS, 2009a, Appendix B).

To calculate the existing quantity of habitat across the range of the DPS both within the currently occupied range and outside the occupied range, we recognized that both habitat quantity and quality should be taken into consideration. As a result, we describe the existing quantity of habitat in terms of functional habitat units. To generate this estimate of functional habitat units, we considered the measured quantity of habitat within each HUC 10 as well as the habitat's quality. The functional habitat units values are a measure of the quantity of habitat (expressed in units where 1 unit of habitat is equivalent to $100m^2$ of habitat) within a HUC 10 based on qualitative factors that limit survivorship of juvenile salmon utilizing the habitat for spawning, rearing, and migration. The functional habitat units also account for dams within or below the HUC 10 that would further reduce survivorship of juvenile salmon within the HUC 10 as the juvenile salmon migrate towards the marine environment. In HUC 10s that are not believed to be limited by qualitative factors or dams, the functional habitat units would be identical to the measured quantity of habitat units within the HUC 10. In HUC 10s where quality and dams are believed to be limiting, the functional habitat units would be less than the measured habitat units within the HUC 10. The functional habitat units value is used in the critical habitat evaluation process to determine the quantity of functioning habitat units within each HUC 10. It also determines the quantity of functioning habitat within the currently occupied range relative to the amount needed to support the offspring of 2,000 adult spawners.

Functional habitat unit scores were generated by multiplying the quantity of spawning and rearing habitat units within each HUC 10 by the habitat quality score divided by 3 (*e.g.*, 1 = 0.33, 2 = 0.66, and 3 = 1; discussed below under application of ESA section 4(b)(2)) to represent the relative values in terms of percentages. Using this approach, a ''1'' habitat quality score has a qualitative value roughly equivalent to 33 percent of fully functioning habitat; accordingly, a ''2'' habitat quality score is roughly 66 percent of the value of fully functioning habitat; and a ''3'' score equals 100 percent habitat quality. The sum of this value was then multiplied by 0.85 raised to the power of the number of dams both within and downstream of the HUC 10. We consider 0.85 to represent a coarse estimate of passage efficiency of smolts for FERC dams with turbines (smolt mortality associated with turbine entrainment is 0.15) based on the findings of several studies (GNP, 1995; GNP, 1997; Holbrook, 2007; Shepard, 1991c; Spicer *et al.*, 1995) and, therefore, roughly equivalent to a 15 percent reduction in functional habitat unit. Mainstem dams without turbines are not expected to affect smolts the way dams with turbines do, but can result in direct or indirect mortality from delays in migration and by increased predation from predators that congregate around dams. Therefore, dams without turbines were estimated to reduce the functional capacity of habitat units by 7.5 percent (one half of 15 percent). Dams located at roughly the midpoint of habitat within a HUC 10 watershed were estimated to affect passage of roughly half the fish in the HUC 10 watershed (*e.g.*, located half way up the HUC 10 watershed) and, therefore, were discounted accordingly (*e.g.*, 7.5 percent for dams with turbines). A dam without turbine located at the midpoint of habitat within a HUC 10 was estimated to reduce the functional capacity of habitat units by 3.75 percent. The number of dams present both within and downstream of the HUC 10 was used as an exponent to account for cumulative effects of dams. A formulaic representation of our method is written as:

$$Q_{SRH} \times (B_{SS}/3) \times (E_{DE}{}^{\wedge N}) = \text{Functional Habitat Units}$$

Q_{SRH} = quantity of spawning and rearing habitat
B_{SS} = biological suitability score
E_{DE} = estimated downstream passage efficiency of a typical FERC licensed dam
N = number of dams within and downstream of HUC

Given that computing the functional habitat units was conducted to estimate the quantity of habitat necessary to support the offspring of 2,000 adult spawners, only downstream passage efficiency was figured into the equation to calculate functional habitat units. We based our projected habitat needs on the amount of habitat needed to support the offspring of 2,000 adult spawners, so our analysis of functional habitat units was based on those factors that would diminish the survival of the offspring of the spawners. This rule is not designed to serve as a recovery plan but rather to ensure that there is sufficient habitat available to meet recovery goals. A full review of how habitat quantities and habitat qualities were computed is provided in the Biological Valuation of Atlantic Salmon Habitat within the GOM DPS (2008).

Table 2 represents the total amount of measured habitat within the occupied areas of each SHRU; the quantity of functional habitat units for each SHRU; amount of habitat excluded; the amount of functional habitat (represented as functional habitat unit) after exclusion; and the amount of habitat still needed to support the offspring of 2,000 adult spawners within each SHRU.

TABLE 2—TOTAL HABITAT AND FUNCTIONAL HABITAT FOR OCCUPIED AREAS AMONG THE THREE SHRUS IN THE GOM DPS

SHRU	Total habitat units	Functional habitat units	Economic exclusion	Functional habitat after exclusions	Additional habitat needed to support the offspring of 2,000 adult spawners (*i.e.*, 30,000 units)
Merrymeeting Bay	372,639	40,001	0	40,001	0
Penobscot Bay	323,740	66,263	3,205	63,058	0
Downeast Coastal	61,395	29,111	0	29,111	889

In both the Penobscot and Merrymeeting Bay SHRUs, there are more than 30,000 units of functional habitat within the currently occupied area to support the offspring of adult spawners. In the Downeast Coastal SHRU, the amount of functional habitat available to the species is estimated to be 889 units short of what is needed to support 2,000 adult spawners. Nonetheless, we determined that no areas outside the occupied geographical area within the Downeast SHRU are essential to the conservation of the species. This is because the 61,395 total habitat units in Downeast Maine are predicted to be functioning at the equivalent of 29,111 units because of the presence of dams or because of degraded habitat features that reduce the habitat's functional value. However, through restoration efforts, including enhanced fish passage and habitat improvement of anthropogenically degraded features (including stream crossing improvement projects like those currently being carried out by Project SHARE in the Downeast SHRU, for example), a substantial portion of the approximately 32,000 units of non-functioning habitat may be restored to a functioning state. The Union River, for instance, has over 12,000 units of habitat, though its functional habitat value, largely because of dams, is estimated to be equivalent to approximately 4,000 units of habitat. Dam removal or improved fish passage has the potential to significantly increase the function of critical habitat in the Union river and, therefore, the entire Downeast SHRU.

Throughout Maine, there has been substantial effort on behalf of State and Federal agencies and non-profit organizations in partnership with landowners and dam owners to restore habitat through a combination of land and riparian protection efforts, and fish passage enhancement projects. Project SHARE, the Downeast Salmon Federation, watershed councils, Trout Unlimited, and the Atlantic Salmon Federation, for example, have conducted a number of projects designed to protect, restore, and enhance habitat for Atlantic salmon ranging from the Kennebec River in south central Maine to the Dennys River in Eastern Maine. Projects include, but are not limited to: dam removals along the Kennebec, St. George, Penobscot, and East Machias Rivers; land protection of riparian corridors along the Machias, Narraguagus, Dennys, Pleasant, East Machias, Sheescot, Ducktrap rivers and Cove Brook; surveying and repair of culverts that impair fish passage; and outreach and education efforts on the benefits of such projects. In 2008 in the Downeast SHRU, Project SHARE replaced 7 culverts with open bottom arch culverts to improve fish passage, decommissioned 12 road crossings by removing the culvert or bridge and stabilizing the banks, and removed 6 remnant log drive dams. The Penobscot River Restoration Project is another example of cooperative efforts on behalf of Federal and State agencies, nonprofit organizations, and dam owners. The PRRP goal is to enhance runs of diadromous fish, including Atlantic salmon, through the planned removal of two mainstem dams and enhanced fish passage around several other dams along the Penobscot River. These cooperative efforts can increase the functional potential of Atlantic salmon habitat by both increasing habitat availability as well as increasing habitat quality. Therefore, we do not believe that it is essential to designate critical habitat outside of the currently occupied range.

V. Application of ESA Section 4(a)(3)(B)(i) (Military Lands)

The Sikes Act of 1997 (16 U.S.C. 670a–670f, as amended), enacted on November 18, 1997, required that military installations with significant natural resources prepare and implement an integrated natural resource management plan (INRMP) in cooperation with the USFWS and State fish and wildlife agencies, by November 18, 2001. The purpose of the INRMP is to provide the basis for carrying out programs and implementing management strategies to conserve and protect biological resources on military lands. Because military lands are often protected from public access, they can include some of the nation's most significant tracts of natural resources. INRMPs are to provide for the management of natural resources, including fish, wildlife, and plants; allow multipurpose uses of resources; and provide public access where appropriate for those uses, without any net loss in the capability of an installation to support its military mission.

In 2003, the National Defense Authorization Act (Pub. L. 108–136) amended the ESA to limit areas eligible for designation as critical habitat. Specifically, section 4(a)(3)(B)(i) of the ESA (16 U.S.C. 1533(a)(B)(i)) states: ''The Secretary shall not designate as critical habitat any lands or other geographical areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 67a), if the Secretary determines in writing that such plan provides a benefit to the species for which critical habitat is proposed for designation.''

Within the specific areas identified as critical habitat for the Gulf of Maine DPS, there are four military sites; two of these currently have INRMPs, and the other two have INRMPs being developed. The Brunswick Naval Air Station has 15,800 acres (63.9 sq km) of real property spread out among the main station in Brunswick and several remote stations across Maine. Military installations that are part of the Brunswick Naval Air Station and that are either partly or entirely within the area where critical habitat is proposed include the 3,091-acre (12.5-sq km) main station in Brunswick; a 12,000-acre (48.5-sq km) Survival, Evasion, Resistance, and Escape (SERE) school near Rangeley, Maine; and the 396-acre (1.6-sq km) Great Pond Outdoor Adventure Center located in the town of Great Pond in Hancock County, Maine.

The two military installations within the occupied range of the DPS with INRMPs are not included in the critical habitat designation in accordance to 4(a)(3)(B)(i) of the ESA. These installations include: (1) The 3,091-acre (12.5-sq km) Brunswick Naval Air Station in Brunswick, Maine, of which 435 acres (1.8 sq km) are within Little Androscoggin HUC 10 watershed in the Merrymeeting Bay SHRU; and (2) the Brunswick Naval Air Station's cold weather survival, evasion, resistance, and escape school, which occupies 12,000 acres (48.5 sq km) near Rangeley, Maine, of which 5,328 acres (21.6 sq km) are within the Sandy River HUC 10 watershed in the Merrymeeting Bay SHRU. The INRMPs at these two locations specifically provide for water quality protection via erosion and sediment control, wetland protection, monitoring of non point source pollution, protection of watersheds from hazardous materials, use of environmentally beneficial landscaping, monitoring for and responding to forestry management units health problems and management of forests as shoreline buffers. We determined that these two INRMPs provide a conservation benefit to the GOM DPS of Atlantic salmon.

The two sites with military missions that currently do not have INRMPs and the one non-military facility identified as being essential to national security are being excluded from critical habitat under section 4(b)(2) described in the final rule section entitled *Application of ESA Section 4(b)(2).*

VI. Application of ESA Section 4(b)(2)

The foregoing discussion described the specific areas within U.S. jurisdiction that meet the ESA definition of critical habitat because they contain the physical and biological features essential to the conservation of Atlantic salmon that may require special management considerations or protection. Before including areas in a designation, section 4(b)(2) of the ESA requires the Secretary to consider the economic impact, impact on national security, and any other relevant impacts of designation of any particular area. The Secretary has the discretion to exclude any area from designation if he determines that the benefits of exclusion (that is, avoiding some or all of the impacts that would result from designation) outweigh the benefits of designation based upon the best scientific and commercial data available. The Secretary may not exclude an area from designation if exclusion will result in the extinction of the species. Because the authority to exclude is discretionary, exclusion is not required for any particular area under any circumstances.

The ESA section 4(b)(2) exclusion process is conducted for a ''particular area,'' not for the critical habitat as a whole. This analysis is, therefore, conducted at a geographic scale that divides the area under consideration into smaller sub-areas. The statute does not specify the exact geographic scale of these ''particular areas.'' For the purposes of the analysis of economic impacts, a ''particular area'' is equivalent to a ''specific area'', defined as a HUC 10 (level 5) standard watershed. There are 48 ''specific areas'' (HUC 10s) occupied by the species on which are found those physical and biological features essential to the conservation of the species and which may require special management considerations or protection.

Where we considered impacts on Indian Tribes, we delineated particular areas based on land ownership. Where we consider impacts on national security, particular areas will be delineated based on lands identified by the military as areas where critical habitat designation will have an impact on national security. These areas may only account for a small fraction of a HUC 10 watershed or, in some circumstances, may span across several HUC 10 watersheds. Factors that were considered in determining whether the benefits of exclusion outweighed the benefits of designating the particular areas as critical habitat include:

(1) The quantity of functional habitat excluded relative to the quantity of habitat needed to support a recovered population;

(2) The relative biological value of a particular area to the conservation of the species, measured by the quantity and quality of the physical and biological features with the particular area;

(3) The anticipated conservation loss that would be accrued through not designating a particular area based upon the conservation value of that particular area; and

(4) Whether exclusion of habitat within the particular area, based upon the best scientific and commercial data, would result in the extinction of the species concerned.

Assigning Biological Value

To determine the benefits of including an area as critical habitat, we assigned a Final Biological Value to each HUC 10 watershed based on the quantity and quality of Atlantic salmon spawning and rearing habitat and the migratory needs of the species (see NMFS, 2009a). The Final Biological Value indicates each area's current value to Atlantic salmon spawning, rearing, and migration activities and is applied in the ESA section 4(b)(2) exclusion analysis, where it is weighed against the economic, national security, and other relevant impacts to consider whether specific areas may be excluded from designation. The final biological value also aided in determining those areas currently occupied by the species described earlier in the final rule under ''Identifying the Geographical Area Occupied by the Species and Specific Areas within the Geographical Area''. The variables used to develop the Final Biological Value include a combination of habitat units, habitat quantity, habitat quality, and the value of the HUC 10 to migration of smolts and adults. The final biological value does not incorporate the use of functional habitat units as described in the previous section entitled *Specific areas outside the geographical area occupied by the species * * * essential to the conservation of the species*. Functional habitat units were only used to determine whether areas that contain PCEs outside the currently occupied range should be designated as critical habitat.

A habitat unit represents 100 m^2 of spawning and rearing habitat. A habitat unit is used in North America and Europe to quantify habitat features most frequently used for spawning and juvenile rearing (*e.g.*, riffles and runs). Habitat units for each HUC 10 were calculated using the GIS based habitat prediction model described earlier in the final rule under *Physical and Biological Features in Freshwater and Estuary Specific Areas Essential to the Conservation of the Species*.

Habitat quantity is the estimate of habitat units generated by the model and was calculated separately for each HUC 10. The units of habitat were then binned into four categories for each of the three SHRUs. A HUC 10 with no habitat was assigned a score of ''0'' and was considered unoccupied. HUC 10s with the lowest 25 percent of total units of habitat across the entire SHRU received a ''1'' score, the middle 50 percent received a ''2'' score, and the upper 25 percent received a ''3'' score. A ''3'' score represents the highest relative habitat quantity score. This method resulted in the majority of the habitat receiving a score of ''2'' representing an average habitat quantity. Habitat scores outside the middle 50 percent were considered to have above average habitat quantity or below average habitat quantity.

Habitat quality scores were assigned to HUC 10s based on information and input from fisheries biologists working with the Maine Department of Inland Fisheries and Wildlife, the MDMR, NMFS, and Kleinschmidt Energy and Water Resource Consultants, who possess specific knowledge and expertise about the geographic region. For each of the three SHRUs, a minimum of three biologists with knowledge of and expertise in the geographic area were asked to independently assign habitat scores, using a set of scoring criteria developed by fisheries biologists from NMFS, to HUC 10s based on the presence and quality of the physical and biological features essential to the conservation of the species (see NMFS, 2009a). The scoring criteria ranked qualitative features, including temperature, biological communities, water quality, and substrate and cover, as being highly suitable (''3''), suitable (''2''), marginally suitable (''1'') or not suitable (''0'') for supporting Atlantic salmon spawning, rearing, and migration activities. A habitat value of ''0'' indicates that one or more factors is limiting to the point that Atlantic salmon could not reasonably be expected to survive in those areas; a score of ''1'', ''2'', or ''3'' indicates the extent to which physical and biological features are limiting, with a ''1'' being most limiting and a ''3'' being not limiting. In HUC 10s that are and have always been inaccessible due to natural barriers, the entire HUC 10 was automatically scored as ''0'' and considered not occupied by the species. Emphasis was placed on identifying whether the physical and biological features needed for Atlantic salmon spawning and rearing are present and of what quality the features are. The overall habitat quality score for each HUC 10 was typically an average determined by the compilation of scores. In some instances, not all the biologists were familiar with the HUC 10, so only one or two scores were provided for some HUCs. In some instances where only two scores were provided for a HUC 10 watershed and each biologist scored the watershed differently we relied on a combination of the comments provided on the score sheets, knowledge from fisheries biologist working for NMFS that were familiar with these HUCs, or phone interviews with the commenters to resolve the ''tie'' score. We resolved ''tie'' scores based on comments when it was clearly apparent, based on the comments, that one biologist had more knowledge of the HUC 10 than the other biologist who scored the HUC 10.

Final Habitat Values were generated for each HUC 10 by combining habitat quantity and habitat quality scores within each HUC 10. Scores were combined by multiplying the two variables together giving scores of 0, 1, 2, 3, 4, 6, 9. HUC 10s with zero scores received a zero score for Final Habitat Value. Scores of 1 or 2 were valued as low or ''1'' final habitat value. Scores of 3 or 4 were valued as medium or ''2'' final habitat value, and scores of 6 or 9 were valued as high or ''3'' final habitat value.

A final migration value was generated based on the final habitat values and the migratory requirements of adults to reach spawning areas and smolts to reach the marine environment. We determined the final migration value of a HUC 10 to be equal to the highest final habitat value upstream from the HUC 10 because we concluded that access to spawning and rearing habitat was equally as important as the spawning and rearing habitat itself.

The final biological value for each HUC 10, which is the value used in weighing economic cost against the biological value of habitat to salmon, was determined by selecting the higher of the final habitat value and the final migration score of each HUC 10. This approach assures the preservation of spawning and rearing habitat as well as migration habitat (see NMFS, 2009a).

Consideration of Economic Impacts, Impacts to National Security and Other Relevant Impacts

The impact of designating any particular area as critical habitat occurs primarily through section 7 of the ESA. Once critical habitat is designated, section 7(a)(2) requires that Federal agencies ensure any action they authorize, fund, or carry out (this action is called the ''Federal nexus'') is not likely to result in the destruction or adverse modification of critical habitat (16 U.S.C. 1536(a)(2)). Parties involved in section 7 consultations include NMFS or the USFWS, a Federal action agency, and in some cases, a private entity involved in the project or land use activity. The Federal action agency serves as the liaison with NMFS. Under Section 7(a)(2), when a Federal agency proposes an action that may affect a listed species or its critical habitat, it must initiate formal consultation with NMFS (or the USFWS, as applicable) or seek written concurrence from the Service(s) that the action is not likely to adversely affect listed species or its designated critical habitat. Formal consultation is a process between the Services and a Federal agency designed to determine whether a proposed Federal action is likely to jeopardize the continued existence of a species or destroy or adversely modify critical habitat, an action prohibited by the ESA. If the action is likely to destroy or adversely modify critical habitat, then the Federal agency may be required to implement a reasonable and prudent alternative (RPA) to the proposed action to avoid the destruction or adverse modification of critical habitat. In addition, conservation benefits to the listed species would result when the consultation process avoids destruction or adverse modification of its critical habitat through inclusion of RPAs, or avoids lesser adverse effects to critical habitat that may not rise to the level of adverse modification through inclusion of harm avoidance measures.

Outside of the Federal agencies' obligation to consult on actions that ''may affect'' critical habitat and adopt project modifications to avoid destruction or adverse modification, the ESA imposes no requirements or limitations on entities or individuals as a result of a critical habitat designation.

Economic Impacts

As discussed above, economic impacts of the critical habitat designation result from implementation of section 7 of the ESA. Section 7(a)(2) requires Federal agencies to consult with NMFS to ensure their proposed actions are not likely to destroy or adversely modify critical habitat. These economic impacts may include both administrative and project modification costs. Economic impacts may also be associated with the conservation benefits of the designation.

Economic impacts were assessed for each specific HUC 10 area designated as critical habitat, as well as for unoccupied areas within the range of the GOM DPS. While we are not designating unoccupied areas as critical habitat, we evaluated the economic impacts in the event that we determined in the biological valuation process, or determine as a result of public comment or subsequently available information, that some or all of the unoccupied areas were found to be to be essential to the conservation of the species. For the entire range of the GOM DPS, most of the economic impact results from impacts to hydropower projects and development (IEc, 2009a). The estimated economic impact of designation of the occupied areas before economic exclusions ranges from approximately $128 million to $152 million.

For the designation of critical habitat for the GOM DPS, economic exclusions within the 48 occupied HUC 10s throughout the range of the DPS were considered by weighing biological value determined in the biological valuation and the economic cost determined in the economic analysis. As described earlier, the biological values were assigned a score of 1, 2, or 3, with a ''1'' being of lowest biological value and a ''3'' being of highest biological value. Areas could also be assigned a biological value of ''0'' if the physical and biological features in those areas were so degraded that they were not considered essential to the conservation of salmon. Areas assigned a ''0'' score were not included in the economic exclusion analysis. As stated above, we consider these areas to be unoccupied, and we determined that no unoccupied areas were essential to the conservation of the GOM DPS.

To compare economic cost with biological value, we used the range of monetized values provided in the economic analysis binned into three categories, with a score of ''1'' representing low economic cost and a score of ''3'' representing high economic cost. These categories illustrate economic costs over the range of the GOM DPS. The high, medium, and low scores assigned to economic costs were then used to weigh economic cost against the corresponding biological value (also scored as high, medium, or low) of each HUC 10. The binning process was designed to describe a range of monetized values in qualitative terms that could be directly compared with the qualitative assessment of the physical and biological habitat features essential to the conservation of the species. The binning was conducted so that the lowest 25 percent of the total economic costs represent costs that were below average. Low economic costs were assigned a score of ''1,'' representing a cost ranging from $71,000 to $388,000. The middle 50 percent represents the average cost across all HUCs containing critical habitat and received a score of ''2,'' with economic cost ranging from $388,001 to $3,420,000. The upper 25 percent represents those costs that were above average or high and received a score of ''3,'' with economic cost ranging from $3,420,001 to $27,900,000. We binned the economic costs using the same procedures that we used to bin habitat quantity within each HUC 10, with the lower and upper 25 percent of habitat representing those areas as being either above average or below average.

These dollar thresholds do not represent an objective judgment that low-value areas are worth no more than $388,000, medium-value areas are worth no more than $3,420,000, or high value areas are worth no more than $27,900,000. Under the ESA, we are to weigh dissimilar impacts given limited time and information. The statute emphasizes that the decision to exclude is discretionary. Thus, the economic impact level at which the economic benefits of exclusion outweigh the conservation benefits of designation is a matter of discretion and depends on the policy context. For critical habitat, the ESA directs us to consider exclusions to avoid high economic impacts, but also requires that the areas designated as critical habitat are sufficient to support the conservation of the species and to avoid extinction. In this policy context, we selected dollar thresholds representing the levels at which we believe the economic impact associated with a specific area would outweigh the conservation benefits of designating that area.

Given the low abundance and endangered status of Atlantic salmon, we exercise our discretion to consider exclusion of specific areas based on three decision rules: (1) Specific areas with a biological value of medium (''2'') or high (''3'') score were not eligible for exclusion regardless of the level of economic impact, because of the endangered status of Atlantic salmon; (2) specific areas with a low biological value (''1'') were excluded if the economic costs were greater than $388,000 (economic score of ''2'' or ''3''); and (3) specific areas were not considered for exclusion, including those areas having a low biological value (''1''), if the area had no dams both within it or below it, given that these areas are not subject to the deleterious effects that dams have on migration of adults and smolts (GNP, 1995; GNP, 1997; Holbrook, 2007; Shepard, 1991c; Spicer *et al.*, 1995).

These decision rules: (1) Ensure that enough occupied habitat receives the protections of critical habitat to meet our conservation objectives, in this case, 30,000 units of habitat per SHRU; (2) ensure that all habitat that has average (2 score) or better biological value receives the protections of critical habitat and is available to be used for the conservation and recovery of the species; and (3) given that dams have been identified as one of the greatest impediments to salmon recovery (NRC, 2004; Fay *et al.*, 2006), ensure that occupied areas without dams receive the protections of critical habitat.

If we excluded all areas where economic costs were higher than biological value, then the Downeast Coastal SHRU would be 3,840 units short of the 30,000 units needed to meet our conservation objectives. Habitat that is excluded for economic impact reasons offers no protections to those features that are essential to the conservation of Atlantic salmon. In contrast, tribal lands and military lands excluded from the Downeast Coastal SHRU were excluded because of ongoing conservation efforts being carried out by the Tribe or natural resource plans that are in place or in development by the military that provide protections to Atlantic salmon habitat.

We believe that all habitat with a biological value of ''2'' or greater is essential to the recovery efforts of Atlantic salmon. In the Gulf of Maine, of the 105 HUC 10 watersheds that we analyzed for critical habitat, we determined that 86 HUC 10s were historically accessible to Atlantic salmon. Of those 86 historic watersheds, only 48 of those HUC 10 watersheds are currently occupied by Atlantic salmon and provide the best opportunity for the agencies to implement on the ground recovery efforts through stocking programs and habitat restoration and enhancement efforts. Of the 48 occupied HUC 10 watersheds, 32 of these watersheds are considered to have average (''2'' score) or better biological value. These 32 remaining watersheds provide the best opportunity for managers to carry out restoration efforts, and provide the best potential for recovery of Atlantic salmon across the DPS.

We believe that protection of specific areas without dams is imperative to salmon recovery. The fact that the National Research Council (NRC, 2004) and the Atlantic Salmon Status Review (Fay *et al.*, 2006) both emphasize that dams are one of the greatest impediments to salmon recovery in the State of Maine underscores the importance of specific areas that are free of dams, even if these specific areas have relatively low biological value. Even highly effective passage facilities cause Atlantic salmon mortality. Passage inefficiency and delays associated with dams occur at biologically significant levels, resulting in incremental losses of pre-spawn adults, smolts, and kelts (a life stage after Atlantic salmon spawn) (See the final rule published by NMFS and the USFWS in today's **Federal Register** (see Endangered and Threatened Species; Determination of Endangered Status for the Gulf of Maine Distinct Population Segment of Atlantic Salmon)). Dams can delay migration of smolts, increasing predation risk (Nettles and Gloss, 1987) or cause Atlantic salmon smolts to miss the migration window in which smolts are physiologically capable of transitioning from the freshwater environment to the marine environment (Whalen *et al.*, 1999; McCormick *et al.*, 1999). Studies in the Columbia River system have shown that fish generally take longer to pass a dam on a second attempt after fallback compared to the first (Bjornn *et al.*, 1999). Dams can also cause direct injury to downstream migrating Atlantic salmon smolts, which can be a result of pressure changes during turbine entrainment or direct contact with the turbines (Cada, 2000). Dams are known to typically injure or kill between 10 and 30 percent of all fish entrained at turbines (EPRI, 1992). With rivers containing multiple hydropower dams, these cumulative losses could compromise entire year classes of Atlantic salmon.

With at least 116 dams in the Penobscot watershed (FERC, 1997), 18 of which currently generate electricity; 73 dams in the Kennebec watershed, 26 of which are licensed hydropower facilities and storage dams (MSPO, 1993); and 85 dams in the Androscoggin watershed, 45 of which are hydroelectric facilities, there are very few areas remaining that are free of dams. In fact, of the six stocks of Atlantic salmon that make up the genetic line of the Atlantic salmon conservation hatchery program, five of those stocks come from rivers that currently do not have hydroelectric dams, and four of those stocks originate from rivers where their mainstems below the headwaters are free of dams. The areas that are currently free of dams provide the best opportunity for maintaining the existing genetic line of Atlantic salmon, and rebuilding the Atlantic salmon population either through recolonization that occurs naturally through straying or through managed stocking programs.

We propose to exclude three particular areas (HUC 10s) in the Penobscot Bay SHRU due to economic impact, out of a total of 48 occupied HUC 10s within the range of the GOM DPS. Areas excluded from critical habitat for reasons of economics include approximately 1,198 km of river, stream, and estuary habitat and 99 sq km of lakes in all of Belfast Bay (HUC 105000218), Passadumkeag River (HUC 102000503), and Molunkus Stream (HUC 102000306). The combined economic impact of the designation in those particular areas was estimated to be $11,600,000 to $12,600,000 before they were considered for exclusion. The estimated economic impact for critical habitat following exclusions ranges from approximately $117 million to $140 million. The estimated economic impacts of designating critical habitat for each SHRU are in Table 3.

TABLE 3—SUMMARY OF ECONOMIC IMPACT FOLLOWING EXCLUSIONS FOR OCCUPIED HUC 10 BY SHRU IN THE GOM DPS

SHRU	Low estimate	High estimate
Downeast Coastal	$9,710,000	$12,700,000
Penobscot Bay	23,800,000	28,700,000
Merrymeeting Bay	83,400,000	98,100,000
Total	116,910,000.00	139,500,000.00

National Security and Other Relevant Impacts in Relation to Military Interests

Section 4(b)(2) of the ESA states that the Secretary may exclude any area from critical habitat if he determines that the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat, unless he determines, based on the best scientific and commercial data available, that the failure to designate such areas as critical habitat will result in the extinction of the species concerned (16 U.S.C. 1533(b)(2)). We are excluding the two sites with military missions without INRMPs from critical habitat designation under section 4(b)(2) of the ESA as the Secretary has determined that the benefits of exclusion of these areas outweigh the benefits of inclusion. NAS Brunswick OAC supports the naval aviation activities of NAS Brunswick, and the NCTAMS provides communications to the fleet in the Atlantic Ocean and the Mediterranean Sea. The consultations and project modifications required by designation of these areas as critical habitat would impact the military and national security missions of these facilities. In addition, upon the completion of the INRMPs, any final rule designating these areas as critical habitat would need to be revised to remove these areas from the designation in accordance with section 4(a)(3)(B)(i) of the ESA. The Navy has agreed to work cooperatively with NMFS in the development of these INRMPs to assure that the Navy's activities are reasonably protective of Atlantic salmon habitat (Letter to NMFS from the Office of the Chief of Navy Operations (Ser N4/8u156068), December 2, 2008).

Before including areas in a designation, section 4(b)(2) of the ESA requires the Secretary to consider the impact on national security of designation of any particular area as critical habitat. Bath Iron Works (BIW) located in Bath, Maine has also been excluded from designation for reasons of national security as advised by the Navy. The Secretary has concluded that the benefits of exclusion of these areas outweigh the benefits of inclusion as critical habitat. BIW is a premier ship-building facility that provides the design, building, and support of complex navy warships, including the AEGIS Class Destroyers. BIW has been building and servicing the U.S. warships for over 120 years, and their activities are essential to the military mission for the construction, maintenance, and modernization of Navy surface ships. These activities have been identified by the Navy as inherent to national security, whereby, without BIW's ability to construct and test current and future classes of surface ships, mission readiness and U.S. national security is at risk. The consultations and project modifications required by designation of these areas as critical habitat would impact the military and national security functions of these facilities. The areas excluded from designation include the Kennebec River from the south side of the U.S. Route 1 bridge over the Kennebec River down river to 50 feet below the south side of BIWs dry dock, but does not include any portion of Hanson Bay or the thoroughfare between Hanson Bay and the Kennebec River. The specific area excluded from designation lies within a box between four points with the following coordinates: Point 1: N43 54′39.8″, W069 48′43.5″; Point 2: N43 54′40″, W069 48′17.8″; Point 3: N43 54′0.0″, W069 48′47; Point 4: N43 54′0.0″, W069 48′28″.

Other Relevant Impacts: Tribal Lands

The Penobscot Indian Nation and the Passamaquoddy Tribe own and conduct activities on lands within the range of the GOM DPS. Activities may include agriculture; residential, commercial, or industrial development; in-stream construction projects; silviculture; water quality monitoring; hunting and fishing; and other uses. Some of these activities may be affected by the designation of critical habitat for the GOM DPS of Atlantic salmon.

Secretarial Order 3206 recognizes that Tribes have governmental authority and the desire to protect and manage their resources in the manner that is most beneficial to them. Pursuant to the Secretarial Order, and consistent with the Federal government's trust responsibilities, the Services must consult with the affected Indian Tribes when considering the designation of critical habitat in areas that may impact tribal trust resources, tribally-owned fee lands, or the exercise of tribal rights. Critical habitat in such areas, unless determined to be essential to conserve a species, may not be designated.

The Indian lands specifically excluded are those defined in Secretarial Order 3206 and include: (1) Lands held in trust by the United States for the benefit of any Indian tribe; (2) lands held in trust by the United States for any Indian Tribe or individual subject to restrictions by the United States against alienation; (3) fee lands, either within or outside the reservation boundaries, owned by the tribal government; and, 4) fee lands within the reservation boundaries owned by individual Indians. Not excluded from designation are tribal lands held by the Penobscot Tribe which specifically requested that their land not be excluded from designation emphasizing the importance of their lands as critical habitat for Atlantic salmon.

The Penobscot Indian Nation and the Passamaquoddy Tribe own and conduct activities on approximately 182,000 acres (736.5 sq km) of land throughout the Penobscot, Androscoggin, Kennebec, and Downeast Coastal Basins. Both tribes that own lands within the GOM DPS have actively pursued or participated in activities to further promote the health and continued existence of Atlantic salmon and their habitats. The Penobscot tribe has developed and maintained its own water quality standards that state ''it is the official policy of the Penobscot Nation that all waters of the Tribe shall be of sufficient quality to support the ancient and historical traditional and customary uses of such tribal waters by members of the Penobscot Nation.'' The Tribe is also currently participating in the Penobscot River Restoration Project that has the intended goal of restoring 11 species of diadromous fish, including Atlantic salmon. The Passamaquoddy Tribe has continued to maintain efforts to balance agricultural practices with natural resources. In a tract of Tribal land in Township 19, which accounts for approximately 12 km of the 27.8 km of rivers and streams on Passamaquoddy land that contain physical and biological features essential to salmon, the Tribe has established an ordinance to govern its water withdrawals for these lands. This ordinance states ''it is important to the Tribe that its water withdrawals at T. 19 do not adversely affect the Atlantic salmon in any of its life stages, or its habitat,'' and restricts water withdrawals to avoid adverse impact on the Atlantic salmon.

Within the occupied range designated as critical habitat, the Tribes own approximately 65,000 acres (263 sq km) of land within 16 HUC 10 watersheds. NMFS has determined that the rivers, streams, lakes, and estuaries of 9,571 acres (38.7 sq km) of tribal land within the areas occupied by the GOM DPS be excluded from critical habitat designation based on the principles of the Secretarial Order discussed above. Per request of the Penobscot Nation, 55,180 acres (223 sq km) of the Penobscot Nation lands are included as critical habitat.

Determine Whether Exclusion Will Result in Extinction of the Species

Section 4(b)(2) states that particular areas shall not be excluded from critical habitat if the exclusion will result in extinction of the species. Our decision to only propose for exclusion particular areas based on economic impacts that had low biological value, unless dams were absent from the particular area, led to exclusions only in the Penobscot SHRU. No economic exclusions are in the Downeast Coastal or Merrymeeting Bay SHRUs. Given that exclusions based on economic impacts within the Penobscot SHRU were only made in areas considered to have little biological value to Atlantic salmon, those exclusions are not considered to jeopardize the species' continued existence because those areas do not diminish the functional habitat unit below what is needed to support a recovered GOM DPS.

Even though 156 units of habitat on tribal and military lands in the Downeast Coastal SHRU are being excluded from critical habitat, we do not believe that exclusions of these lands will reduce the conservation value of Atlantic salmon habitat. We do not believe that exclusion of Passamaquoddy tribal lands, including their lands in the Downeast Coastal SHRU, will reduce the conservation value or functional habitat unit of Atlantic salmon habitat within those particular areas, given the ongoing cooperative efforts between the Tribe and the agencies. We do not believe that excluding the two military installations that contain critical habitat in the Downeast Coastal SHRU from the critical habitat designation is likely to result in the extinction of the species.

VII. Effects of Critical Habitat Designation

ESA Section 7 Consultation

The cost of specifying any particular area as critical habitat occurs primarily through section 7 of the ESA. Once critical habitat is designated, section 7(a)(2) requires that Federal agencies ensure any action they authorize, fund or carry out (this action is called the ''Federal nexus'') is not likely to result in the destruction or adverse modification of critical habitat (16 U.S.C. 1536(a)(2)). Parties involved in section 7 consultations include NMFS or the USFWS, a Federal action agency, and in some cases, a private entity involved in the project or land use activity. The Federal action agency serves as the liaison with NMFS. Under Section 7(a)(2), when a Federal agency proposes an action that may affect a listed species or its critical habitat, then they must initiate formal consultation with NMFS (or the USFWS, as applicable) or seek written concurrence from the Services that the action is not likely to adversely affect listed species or its designated critical habitat. Formal consultation is a process between the Services and a Federal agency designed to determine whether a proposed Federal action is likely to jeopardize the continued existence of a species or destroy or adversely modify critical habitat, an action prohibited by the ESA. If the action is likely to destroy or adversely modify critical habitat, then the Federal agency may be required to implement a reasonable and prudent alternative (RPA) to the proposed action to avoid the destruction or adverse modification of critical habitat. Harm avoidance measures may also be implemented to avoid lesser adverse effects to critical habitat that may not rise to the level of adverse modification. Outside of the Federal agencies' obligation to consult with respect to actions that may affect critical habitat and adopt project modifications to avoid destruction or adverse modification, the ESA imposes no requirements or limitations on entities or individuals as result of a critical habitat designation.

The benefits of designation used for the proposed critical habitat designation for the GOM DPS are the biological values assigned to each HUC 10 that evaluate the quality and quantity of the physical and biological features within each HUC 10 and the current potential of each HUC 10 to support (absent dams) the spawning, rearing, and migration of the GOM DPS (NMFS, 2009a).

Activities That May Be Affected (Section 4(b)(8))

Section 4(b)(8) of the ESA requires that we describe briefly and evaluate in any proposed or final regulation to designate critical habitat, those activities that may destroy or adversely modify such habitat or that may be affected by such designation. A wide variety of activities may affect critical habitat and, when carried out, funded, or authorized by a Federal agency, will require an ESA section 7 consultation. Such activities (detailed in IEc, 2009a) include, but are not limited to agriculture, transportation, development and hydropower.

We believe this critical habitat designation will provide Federal agencies, private entities, and the public with clear notification of critical habitat for Atlantic salmon and the boundaries of such habitat. This designation will allow Federal agencies and others to evaluate the potential effects of their activities on critical habitat to determine if ESA section 7 consultation with NMFS is needed given the specific definition of physical and biological features.

VIII. Classification

Regulatory Planning and Review

This final rule has been determined to be significant for purposes of Executive Order (E.O.) 12866. We have integrated the regulatory principles of the E.O. into the development of this final rule to the extent consistent with the mandatory duty to designate critical habitat, as defined in the ESA.

Coastal Zone Management Act (15 U.S.C. 1451 et seq.) We have determined that this action is consistent to the maximum extent practicable with the enforceable policies of the approved coastal management program of the State of Maine. The determination has been submitted for review by the responsible State agency under section 307 of the Coastal Zone Management Act (16 U.S.C. 1451 *et seq.*).

Regulatory Flexibility Act (U.S.C. 601 et seq.)

We prepared a final regulatory flexibility analysis (FRFA) pursuant to section 603 of the Regulatory Flexibility Act (RFA) (5 U.S.C. 601 *et seq.*) (IEc, 2009b). This FRFA only analyzes the impacts to those areas where critical habitat is designated and is available at the location identified in the **ADDRESSES** section. The FRFA is summarized below, as required by section 603 of the RFA. The FRFA describes the economic impact this final rule would have on small entities. A description of the action, why it is being considered, and the objectives of and legal basis for this action are contained in the preamble of this rule and are not repeated here. A summary of the FRFA follows:

After reviewing the land use activities evaluated in the economic analysis conducted for this action, the types of small entities that may be impacted include those entities involved in hydropower, agriculture, and development activities. The total number of affected small entities includes up to 11 dam owners and 62 farms. There are an unknown number of small entities involved in development projects. Because impacts are calculated on a per acre basis and not for specific projects, it is not possible to identify specific landowners.

This action does not contain any new collection-of-information, reporting, recordkeeping, or other compliance requirements beyond the potential economic impacts described below and any reporting requirements associated with reporting on the progress and success of implementing project modifications, which do not require special skills to satisfy. Third party applicants or permittees may also incur costs associated with participating in the administrative process of consultation along with the permitting Federal agency.

No Federal laws or regulations duplicate or conflict with the final rule. Existing Federal laws and regulations overlap with the final rule only to the extent that they provide protection to marine natural resources generally. However, no existing laws or regulations specifically prohibit destruction or adverse modification of critical habitat for, and focus on the recovery of, Atlantic salmon.

In conducting the FRFA, we considered three regulatory alternatives and the impacts of these alternatives. Alternative 1 was designating the bankfull width of rivers and perennial streams throughout the 105–HUC 10 study area as critical habitat for Atlantic salmon. Only 48 of these HUCs, however, are currently occupied by the salmon and contain the physical and biological features essential to the conservation of the species. We determined that the 57 HUCs that are currently unoccupied are not essential to the conservation of the species. Accordingly, we rejected this alternative. Alternative 2 was to designate as critical habitat the bankfull width of rivers and perennial streams within the 48 occupied HUCs. We rejected this alternative because we determined that, in certain cases, the benefits of excluding particular areas outweigh the benefits of including them in the designation, and excluding these areas will not result in extinction of the species. Alternative 3 limits the designation of critical habitat to the bankfull width of rivers and perennial streams within 45 of the 48 occupied HUCs. This is the alternative that we have accepted and the alternative described in the FRFA.

The FRFA estimates for alternative 3, that approximately 62 small farms (average annual receipts of less than $750,000) may be affected by critical habitat designation (IEc, 2009b). The average annual revenue of these farms was estimated at $74,000 (USDA, 2002). The estimated average losses per small farm are estimated at $6,300 (IEc, 2009b).

Impacts to development are based on impacts to landowners associated with constraints on development within a 30-meter buffer of streams within the study area. The present value of impacts to all development projects is estimated at $94.6 million to $127 million. Section 3 of the Small Business Act defines small business as any firm that is independently owned and operated and is not dominant in its field of operation. The U.S. Small Business Administration (SBA) has developed size standards to carry out the purposes of the Small Business Act, and those size standards can be found in 13 CFR 121.201. Size standards are expressed either in number of employees or annual receipts in millions of dollars depending on the specific type of business. Because impacts to development projects are determined on a per acre basis and not by the specific type of development project, we were unable to determine who the specific affected landowners are. In some cases, some portion of these landowners are likely individuals and not businesses, and, therefore, not relevant to the small business analysis, while it is also likely that some of these landowners are businesses, including small businesses, that may be impacted by constraints.

Land developers and subdividers are one type of small business that may be affected by constraints stemming from the final critical habitat designation (IEc, 2009b). The available data suggest that 188 small land developers operate in counties that overlap the 45 HUCs containing critical habitat, accounting for 97 percent of the subdividers in the region (IEc, 2009b). The information available, however, is insufficient to estimate the impacts on these entities or to identify other potentially affected landowners (IEc, 2009b).

Impacts to hydropower were estimated for small hydropower producers identified by the Small Business Administration as those producing less than four billion kilowatt-hours annually and are likely to experience impacts associated with the critical habitat designation. The FRFA analysis (IEc, 2009b) estimates 11 hydropower producers within the 45 HUCs that contain critical habitat may be affected. The estimated annualized cost accrued by these dam owners is between $50 to $294,000 (IEc, 2009b).

Critical habitat designation may encourage landowners to develop Habitat Conservation Plans (HCPs). Under section 10 of the ESA, landowners seeking an incidental take permit must develop an HCP to counterbalance the potential harmful effects that an otherwise lawful activity may have on a species. The purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. Thus, HCPs are developed to ensure compliance with section 9 of the ESA and to meet the requirements of section 10 of the ESA. Neither the FRFA nor the Economic Analysis forecasts effects associated with the development of HCPs.

Information Quality Act (IQA) (Section 515 of Pub. L. 106–554)

The data and analyses supporting this designation have undergone a pre-dissemination review and have been determined to be in compliance with applicable information quality guidelines implementing the Information Quality Act (IQA) (Section 515 of Pub. L. 106–554).

In December 2004, the Office of Management and Budget (OMB) issued a Final Information Quality Bulletin for Peer Review pursuant to the IQA. The Bulletin established minimum peer review standards, a transparent process for public disclosure of peer review planning, and opportunities for public participation with regard to certain types of information disseminated by the Federal government. The peer review requirements of the OMB Bulletin apply to influential or highly influential scientific information disseminated on or after June 16, 2005. To satisfy our requirements under the OMB Bulletin, we allowed a 90-day public comment period and held two public hearings (Brewer and Augusta, Maine) where we gave the public the opportunity to participate in the review of the proposed critical habitat rule and supporting documents. An independent peer review of the scientific information that supports the proposal to designate critical habitat for the GOM DPS of Atlantic salmon was conducted, and peer review comments were incorporated prior to dissemination of this rulemaking. Four independent peer reviewers were solicited to review the proposed critical habitat rule, though all declined the opportunity to review the document largely due to time constraints. A 4(b)(2) Report (NMFS, 2009) that supports the designation of critical habitat for the GOM DPS of Atlantic salmon was also peer reviewed pursuant to the requirements of the Bulletin and is available on our Web site (see **ADDRESSES**).

Paperwork Reduction Act of 1995 (44 U.S.C. 3501 et seq.)

This final rule does not contain a collection-of-information requirement for purposes of the Paperwork Reduction Act. This final rule will not impose recordkeeping or reporting requirements on State or local governments, individuals, businesses, or organizations. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

National Environmental Policy Act

An environmental analysis as provided for under the National Environmental Policy Act for critical habitat designations made pursuant to the ESA is not required. See *Douglas County* v. *Babbitt,* 48 F.3d 1495 (9th Cir. 1995), cert. denied, 116 S.Ct. 698 (1996).

Federalism

In accordance with Executive Order 13132 ''Federalism,'' agencies are required to ensure meaningful and timely input from State and local officials in the development of regulatory policies that have federalism implications. In accordance with Department of Commerce policies, we requested information from, and coordinated development of, this critical habitat designation with appropriate State resource agencies in the State of Maine.

Takings

In accordance with E.O. 12630, this final rule does not have takings implications. A takings implication assessment is not required. The designation of critical habitat affects only Federal agency actions. This final rule will not increase or decrease the current restrictions on private property concerning take of Atlantic salmon. Critical habitat does not preclude the development of HCPs and issuance of incidental take permits, and, therefore, landowners within areas designated as critical habitat will continue to have the opportunity to use their property in ways consistent with the survival of endangered Atlantic salmon.

IX. References Cited

A complete list of all references cited in this rule making can be found on our Web site at *http://www.nero.noaa.gov/prot_res/altsalmon/*, and is available upon request from the NMFS Northeast Regional Office in Gloucester, Massachusetts (see **ADDRESSES**).

List of Subjects in 50 CFR Part 226

Endangered and threatened species.

Dated: June 12, 2009.

James W. Balsiger,

Acting Assistant Administrator for Fisheries, National Marine Fisheries Service.

■ For the reasons set out in the preamble, 50 CFR part 226 is amended as set forth below:

PART 226—DESIGNATED CRITICAL HABITAT (AMENDED)

■ 1. The authority citation for part 226 continues to read as follows:

Authority: 16 U.S.C. 1533.

■ 2. Add § 226.217 to read as follows:

§ 226.217 Critical habitat for the Gulf of Maine Distinct Population Segment of Atlantic Salmon (Salmo salar).

Critical habitat is designated to include all perennial rivers, streams, and estuaries and lakes connected to the marine environment within the range of the Gulf of Maine Distinct Population Segment of Atlantic Salmon (GOM DPS), except for those particular areas within the range which are specifically excluded. Within the GOM DPS, the primary constituent elements (PCEs) for Atlantic salmon include sites for spawning and incubation, sites for juvenile rearing, and sites for migration. The essential physical and biological features of habitat are those features that allow Atlantic salmon to successfully use sites for spawning and rearing and sites for migration. These features include substrate of suitable size and quality; rivers and streams of adequate flow, depth, water temperature and water quality; rivers, streams, lakes and ponds with sufficient space and diverse, abundant food resources to support growth and survival; waterways that allow for free migration of both adult and juvenile Atlantic salmon; and diverse habitat and native fish communities in which salmon interact with while feeding, migrating, spawning, and resting.

(a) The GOM DPS is divided into three salmon habitat recovery units (SHRUs) within the range of the GOM DPS: These are the Downeast Coastal SHRU, the Penobscot Bay SHRU, and the Merrymeeting Bay SHRU. Critical habitat is being considered only in specific areas currently occupied by the species. Critical habitat specific areas are identified by hydrological unit codes (HUC) and counties within the States of Maine. Hydrological units are those defined by the Department of Interior (DOI), U.S. Geological Survey (USGS) publication, ''Hydrologic Unit Maps'' Water Supply Paper (Seaber *et al.*, 1994) and the following DOI, USGS 1:500,000 scale hydrologic unit map: State of Maine. These documents are incorporated by reference. The incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the USGS publication and the maps may be obtained from the USGS, Map Sales, Box 25286, Denver, CO 80225. Copies may be inspected at NMFS, Protected Resources Division, Office of Protected Resources, 1315 East-West Highway, Silver Spring, MD 20910, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/Federal_register/code_of_Federal_regulations/ibr_locations.html*.

(b) Critical habitat is designated in the Maine counties and towns for the three SHRUs described in paragraphs (b)(1) and (2) of this section. The textual descriptions of critical habitat for each SHRU are included in paragraphs (b)(3) through (6) of this section, and these descriptions are the definitive source for determining the critical habitat boundaries. A general location map (Figure 1) is provided at the end of paragraph (b)(2) and is for general guidance purposes only, and not as a definitive source for determining critical habitat boundaries.

(1) *Maine counties and towns affected.* Critical habitat is designated for the following SHRUs in the following counties and towns.

(i) Counties and towns partially or entirely within areas containing critical habitat in the Downeast Coastal SHRU:

Sub-basin	County	Town
Coastal Washington Hancock.	Penobscot	Clifton, Eddington, Grand Falls Twp, Greenfield Twp, Summit Twp.
	Hancock	Waltham, Bucksport, Dedham, Eastbrook, Ellsworth, Fletchers Landing Twp, Franklin, Great Pond, Hancock, Lamoine, Mariaville, Oqiton Twp, Orland, Osborn, Trenton Otis, Sullivan, Surry, T10 SD, T16 MD, T22 MD, T28 MD, T32 MD, T34 MD, T35 MD, T39 MD, T40 MD, T41 MD, T7 SD, T9 SD.
	Washington	Addison, Alexander, Baileyville, Baring Plt, Beddington, Centerville Twp, Charlotte, Cherryfield, Columbia, Columbia Falls, Cooper, Crawford, Cutler, Deblois, Dennysville, Devereaux Twp, East Machias, Edmunds Twp, Harrington, Jonesboro, Jonesport, Lubec, Machias, Machiasport, Marion Twp, Marshfield, Meddybemps, Milbridge, No 14 Twp, No 21 Twp, Northfield, Princeton, Roque Bluffs, Sakom Twp, Steuben, Trescott Twp, Whiting, Whitneyville, Wesley T18 ED BPP, T18 MD BPP, T19 ED BPP, T19 MD BPP, T24 MD BPP, T25 MD BPP, T26 ED BPP, T27 ED BPP, T30 MD BPP, T31 MD BPP, T36 MD BPP, T37 MD BPP, T42 MD BPP, T43 MD BPP.

(ii) Counties and towns partially or entirely within areas containing critical habitat in the Penobscot Bay SHRU:

Sub-basin	County	Town
Piscataquis	Penobscot	T4 Indian Purchase Twp, Long A Twp, Seboeis Plt, Mattamiscontis Twp, Maxfield, Lagrange, Charleston, Howland, T3 R9 NWP, Edinburg, Hopkins Academy Grant Twp, Garland.
	Piscataquis	Shawtown Twp, TA R11 WELS, TA R10 WELS, TB R10 WELS, Greenville, T7 R9 NWP, Bowdoin College Grant West Twp, T4 R9 NWP, Ebeemee Twp, Moosehead Junction Twp, Lake View Plt, Brownville, Milo, Blanchard Twp, Sebec, Dover-Foxcroft, Abbot, Kingsbury Plt, Parkman, Wellington, Frenchtown Twp, Medford, Sangerville, TB R11 WELS, Katahdin Iron Works Twp, Elliottsville Twp, Shirley, Guilford, Atkinson, Beaver Cove, Williamsburg Twp, Bowdoin College Grant East Twp, Barnard Twp, Monson, Orneville Twp.
	Somerset	Squaretown Twp, Mayfield Twp, Brighton Plt, East Moxie Twp, Bald Mountain Twp T2 R3.
East Branch	Aroostook	Moro Plt, T7 R5 WELS.
	Penobscot	Mount Chase, East Millinocket, Grindstone Twp, Herseytown Twp, Medway, Patten, Soldiertown Twp T2 R7 WELS, Stacyville, T1 R6 WELS, T2 R8 WELS, T3 R7 WELS, T3 R8 WELS, T4 R7 WELS, T4 R8 WELS, T5 R7 WELS, T5 R8 WELS, T6 R6 WELS, T6 R7 WELS, T6 R8 WELS, T7 R6 WELS, T7 R7 WELS, T7 R8 WELS, T8 R6 WELS, T8 R7 WELS, T8 R8 WELS.
	Piscataquis	Mount Katahdin Twp, Nesourdnahunk Twp, Trout Brook Twp, T3 R10 WELS, T4 R10 WELS, T4 R9 WELS, T5 R11 WELS, T5 R9 WELS, T6 R10 WELS, T6 R11 WELS, T7 R10 WELS, T7 R11 WELS, T7 R12 WELS, T7 R9 WELS.
Mattawamkeag	Aroostook	Amity, Bancroft, Benedicta Twp, Crystal, Dudley Twp, Dyer Brook, Forkstown Twp, Moro Plt, North Yarmouth Academy Grant Twp, Oakfield, Orient, Reed Plt, Sherman, Silver Ridge Twp, Smyrna, Upper Molunkus Twp, Webbertown Twp, Weston, T1 R5 WELS, T2 R4 WELS, T3 R3 WELS, T3 R4 WELS, T4 R3 WELS, T7 R5 WELS, TA R2 WELS.
	Penobscot	Carroll Plt, Drew Plt, Herseytown Plt, Kingman Twp, Lee, Lincoln, Mattawamkeag, Mount Chase, Patten, Prentiss Twp T7 R3 NBPP, Springfield, Stacyville, Webster Plt, Winn, T1 R6 WELS, T4 R7 WELS, T6 R6 WELS.
	Washington	T8 R3 NBPP, T8 R4 NBPP.
Penobscot	Aroostook	Benedicta TWP, Molunkus Twp, Sherman, T1 R5 WELS.
	Hancock	Amherst, Blue Hill, Bucksport, Castine, Dedham, Great Pond, Oqiton Twp, Orland, Penobscot, Surry, Verona Island, T3 ND, T32 MD, T34 MD, T35 MD, T39 MD, T40 MD, T41 MD.

Sub-basin	County	Town
	Penobscot	Alton, Argyle Twp, Bangor, Brewer, Burlington, Carmel, Charleston, Chester, Clifton, Corinna, Corinth, Dexter, Dixmont, Eddington, Edinburg, Enfield, Etna, Exeter, Garland, Glenburn, Grand Falls Twp, Hampden, Hermon, Herseytown Twp, Holden, Howland, Hudson, Indian Island, Kenduskeag, Lagrange, Lakeville, Lee, Levant, Lincoln, Lowell, Mattamiscontis Twp, Mattawamkeag, Maxfield, Medway, Milford, Newburgh, Newport, Old Town, Orono, Orrington, Passadumkeag, Plymouth, Seboeis Plt, Springfield, Stacyville, Stetson, Summit Twp, Veazie, Winn, Woodville T1 R6 WELS, T2 R8 NWP, T2 R9 NWP, T3 R1 NBPP, T3 R9 NWP, TA R7 WELS.
	Piscataquis	Medford.
	Waldo	Brooks, Frankfort, Jackson, Knox, Monroe, Montville, Prospect, Searsport, Stockton Springs, Swanville, Thorndike, Waldo, Winterport.
Penobscot Bay	Waldo	Belfast, Belmont, Brooks, Frankfort, Knox, Lincolnville, Monroe, Montville, Morrill, Northport, Searsmont, Searsport, Swanville, Waldo.

(iii) Counties and towns partially or entirely within areas containing critical habitat in the Merrymeeting Bay SHRU:

Sub-basin	County	Town
Lower Androscoggin	Androscoggin	Auburn, Durham, Greene, Leeds, Lewiston, Lisbon, Sabattus, Wales.
	Cumberland	Brunswick, Freeport.
	Kennebec	Litchfield, Monmouth
	Sagadahoc	Bath, Bowdoin, Bowdoinham, Richmond, Topsham.
Merrymeeting Bay	Androscoggin	Livermore Falls.
	Franklin	Avon, Carthage, Chesterville, Farmington, Freeman Twp, Industry, Jay, Madrid Twp, Mount Abram Twp, New Sharon, New Vineyard, Perkins TWP, Phillips, Redington Twp, Salem Twp, Sandy River Plt, Strong, Temple, Township 6 North of Weld, Township E, Washington Twp, Weld, Wilton.
	Kennebec	Augusta, Benton, Chelsea, China, Clinton, Farmingdale, Fayette, Gardiner, Hallowell, Manchester, Oakland, Pittston, Randolph, Rome, Sidney, Vassalboro, Vienna, Waterville, West Gardiner, Windsor, Winslow.
	Lincoln	Alna, Dresden, Whitefield, Wiscasset.
	Sagadahoc	Bowdoinham, Perkins Twp Swan Island, Richmond, Woolwich.
	Somerset	Anson, Athens, Bingham, Brighton Plt, Canaan, Cornville, Fairfield, Hartland, Madison, Mayfield Twp, Mercer, Norridgewock, Pittsfield, Skowhegan, Smithfield, Solon, Starks.
Coastal Drainages East of Small Point.	Cumberland	Brunswick.
	Kennebec	Albion, Pittston, Windsor.
	Knox	Appleton, Camdem, Cushing, Friendship, Hope, Rockland, Rockport, Saint George, South Thomaston, Thomaston, Union, Warren, Washington.
	Lincoln	Alna, Boothbay, Boothbay Harbor, Bremen, Briston, Dresden, Edgecomb, Hibberts Gore, Jefferson, Newcastle, Nobleboro, Somerville, Southport, Waldoboro, Westport Island, Whitefield, Wiscasset.
	Sagadahoc	Arrowsic, Bath, Bowdoinham, Georgetown, Phippsburg, West Bath, Woolwich.
	Waldo	Belmont, Freedom, Liberty, Lincolnville, Montville, Morrill, Palermo, Searsmont.

(2) *Critical habitat boundaries.* Critical habitat includes the stream channels within the designated stream reaches, and includes a lateral extent as defined by the ordinary high-water line (33 CFR 329.11). In areas where the ordinary high-water line has not been defined, the lateral extent will be defined by the bankfull elevation. Bankfull elevation is the level at which water begins to leave the channel and move into the floodplain and is reached at a discharge which generally has a recurrence interval of 1 to 2 years on an annual flood series. Critical habitat in estuaries is defined by the perimeter of the water body as displayed on standard 1:24,000 scale topographic maps or the elevation of extreme high water, whichever is greater.

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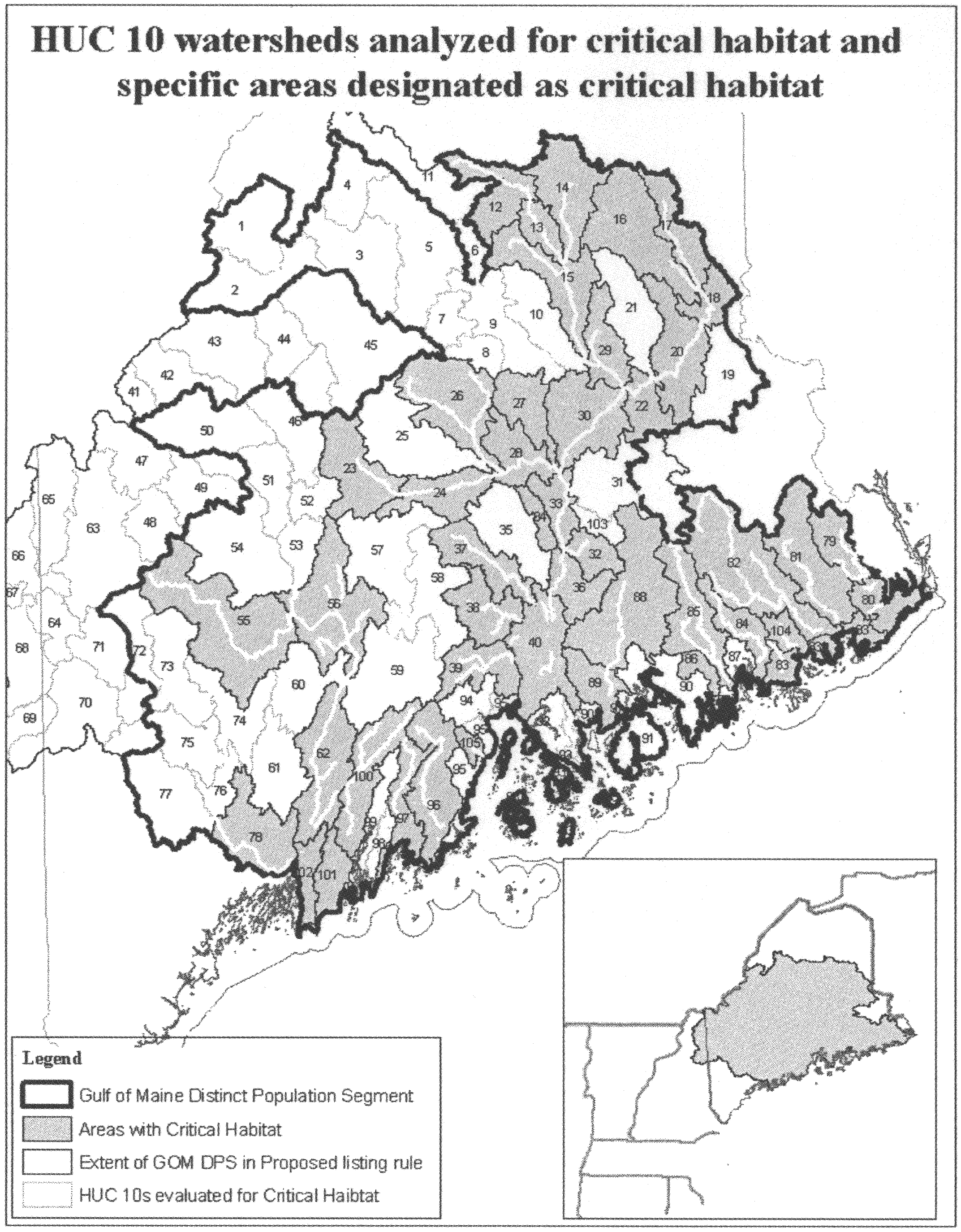

Figure 1

(i) HUC 10 watersheds in the Penobscot Bay SHRU analyzed for critical habitat, those that meet the criteria for critical habitat, and those excluded under ESA section 4(b)(2):

Penobscot Bay SHRU	HUC 10 code	HUC 10 name	Status	Economic (E), Military (M), or Tribal (T) exclusions
1	0102000101	North Branch Penobscot River.		
2	0102000102	Seeboomook Lake.		
3	0102000103	WEST Branch Penobscot River at Chesuncook Lake.		
4	0102000104	Caucomgomok Lake.		
5	0102000105	Chesuncook Lake.		
6	0102000106	Nesowadnehunk Stream.		
7	0102000107	Nahamakanta Stream.		
8	0102000108	Jo-Mary Lake.		
9	0102000109	West Branch Penobscot River (3).		
10	0102000110	West Branch Penobscot River (4).		
11	0102000201	Webster Brook.		
12	0102000202	Grand Lake Matagamon	Critical Habitat.	
13	0102000203	East Branch Penobscot River (2)	Critical Habitat.	
14	0102000204	Seboeis River	Critical Habitat.	
15	0102000205	East Branch Penobscot River (3)	Critical Habitat.	
16	0102000301	West Branch Mattawamkeag River	Critical Habitat.	
17	0102000302	East Branch Mattawamkeag River	Critical Habitat.	
18	0102000303	Mattawamkeag River (1)	Critical Habitat.	
19	0102000304	Baskahegan Stream.		
20	0102000305	Mattawamkeag River (2)	Critical Habitat.	
21	0102000306	Molunkus Stream	Critical Habitat	E
22	0102000307	Mattawamkeag River (3)	Critical Habitat.	
23	0102000401	Piscataquis River (1)	Critical Habitat.	
24	0102000402	Piscataquis River (3)	Critical Habitat.	
25	0102000403	Sebec River.		
26	0102000404	Pleasant River	Critical Habitat.	
27	0102000405	Seboeis Stream	Critical Habitat	T
28	0102000406	Piscataquis River (4)	Critical Habitat.	
29	0102000501	Penobscot River (1) at Mattawamkeag	Critical Habitat.	
30	0102000502	Penobscot River (2) at West Enfield	Critical Habitat	T
31	0102000503	Passadumkeag River	Critical Habitat	E
32	0102000505	Sunkhaze Stream	Critical Habitat.	
33	0102000506	Penobscot River (3) at Orson Island	Critical Habitat.	
34	0102000507	Birch Stream	Critical Habitat.	
35	0102000508	Pushaw Stream.		
36	0102000509	Penobscot River (4) at Veazie Dam	Critical Habitat.	
37	0102000510	Kenduskeag Stream	Critical Habitat.	
38	0102000511	Souadabscook Stream	Critical Habitat.	
39	0102000512	Marsh River	Critical Habitat.	
40	0102000513	Penobscot River (6)	Critical Habitat.	
92	0105000216	Bagaduce River.		
93	0105000217	Stonington Coastal.		
94	0105000218	Belfast Bay	Critical Habitat.	
105	0105000219	Ducktrap River	Critical Habitat.	
103	0102000504	Olamon Stream.		
95	0105000220	West Penobscot Bay Coastal.		

(ii) HUC 10 watersheds in the Merrymeeting Bay SHRU analyzed for critical habitat, those that meet the criteria for critical habitat, and those excluded under ESA section 4(b)(2):

Merrymeeting Bay SHRU	HUC 10 code	HUC 10 name	Status	Military (M) exclusions
41	0103000101	South Branch Moose River.		
42	0103000102	Moose River (2) above Attean Pond.		
43	0103000103	Moose River (3) at Long Pond.		
44	0103000104	Brassua Lake.		
45	0103000105	Moosehead Lake.		
46	0103000106	Kennebec River (2) above The Forks.		
47	0103000201	North Branch Dead River.		
48	0103000202	South Branch Dead River.		
49	0103000203	Flagstaff Lake.		
50	0103000204	Dead River.		
51	0103000301	Kennebec River (4) at Wyman Dam.		
52	0103000302	Austin Stream.		
53	0103000303	Kennebec River (6).		
54	0103000304	Carrabassett River.		
55	0103000305	Sandy River	Critical Habitat	M

Merrymeeting Bay SHRU	HUC 10 code	HUC 10 name	Status	Military (M) exclusions
56	0103000306	Kennebec River at Waterville Dam	Critical Habitat.	
57	0103000307	Sebasticook River at Pittsfield.		
58	0103000308	Sebasticook River (3) at Burnham.		
59	0103000309	Sebasticook River (4) at Winslow.		
60	0103000310	Messalonskee Stream.		
61	0103000311	Cobbosseecontee Stream.		
62	0103000312	Kennebec River at Merrymeeting Bay	Critical Habitat.	
63	0104000101	Mooselookmeguntic Lake.		
64	0104000102	Umbagog Lake Drainage.		
65	0104000103	Aziscohos Lake Drainage.		
66	0104000104	Magalloway River.		
67	0104000105	Clear Stream.		
68	0104000106	Middle Androscoggin River.		
69	0104000201	Gorham-Shelburne Tributaries.		
70	0104000202	Androscoggin River (2) at Rumford Point.		
71	0104000203	Ellis River.		
72	0104000204	Ellis River.		
73	0104000205	Androscoggin River (3) above Webb River.		
74	0104000206	Androscoggin River (4) at Riley Dam.		
75	0104000207	Androscoggin River (5) at Nezinscot River.		
76	0104000208	Nezinscot River.		
77	0104000209	Androscoggin River (6) above Little Androscoggin River.		
78	0104000210	Little Androscoggin River	Critical Habitat	M
96	0105000301	St. George River	Critical Habitat.	
97	0105000302	Medomak River	Critical Habitat.	
98	0105000303	Johns Bay.		
99	0105000304	Damariscotta River.		
100	0105000305	Sheepscot River	Critical Habitat.	
101	0105000306	Sheepscot Bay	Critical Habitat.	
102	0105000307	Kennebec River Estuary	Critical Habitat	M

(iii) HUC 10 watersheds in the Downeast Coastal SHRU analyzed for critical habitat, and those that meet the criteria for critical habitat, and those excluded under ESA section 4(b)(2):

Downeast SHRU	HUC 10 code	HUC 10 name	Status	Tribal (T) exclusions
79	0105000201	Dennys River	Critical Habitat.	
80	0105000203	Grand Manan Channel	Critical Habitat.	
81	0105000204	East Machias River	Critical Habitat	T
82	0105000205	Machias River	Critical Habitat.	
83	0105000206	Roque Bluffs Coastal	Critical Habitat.	
84	0105000208	Pleasant River	Critical Habitat.	
85	0105000209	Narraguagus River	Critical Habitat.	
86	0105000210	Tunk Stream	Critical Habitat.	
87	0105000211	Bois Bubert Coasta.		
88	0105000212	Graham Lake	Critical Habitat.	
89	0105000213	Union River Bay	Critical Habitat.	
90	0105000214	Lamoine Coastal.		
91	0105000215	Mt. Desert Coastal.		
104	0105000207	Chandler River	Critical Habitat.	

(3) *Primary constituent elements.* Within the GOM DPS, the primary constituent elements (PCEs) for the conservation of Atlantic salmon include sites for spawning and incubation, sites for juvenile rearing, and sites for migration. The physical and biological features of the habitat that are essential to the conservation of Atlantic salmon are those features that allow Atlantic salmon to successfully use sites for spawning and rearing and sites for migration. These features include:

(i) 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;

(ii) 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;

(iii) Freshwater spawning and rearing sites with clean gravel in the presence of cool, oxygenated water and diverse substrate to support emergence, territorial development, and feeding activities of Atlantic salmon fry;

(iv) Freshwater rearing sites with space to accommodate growth and survival of Atlantic salmon parr, and population densities needed to support sustainable populations;

(v) Freshwater rearing sites with a combination of river, stream, and lake habitats, that accommodate parr's ability to occupy many niches and to maximize parr production;

(vi) Freshwater rearing sites with cool, oxygenated water to support growth and survival of Atlantic salmon parr;

(vii) Freshwater rearing sites with diverse food resources to support growth and survival of Atlantic salmon parr;

(viii) Freshwater and estuary migratory sites free from physical and biological barriers that delay or prevent access to spawning grounds needed to support a recovered population;

(ix) Freshwater and estuary migration sites with abundant, diverse native fish communities to serve as a protective buffer against predation;

(x) Freshwater and estuary migration sites free from physical and biological barriers that delay or prevent emigration of smolts to the marine environment;

(xi) Freshwater and estuary migration sites with sufficiently cool water temperatures and water flows that coincide with diurnal cues to stimulate smolt migration;

(xii) Freshwater migration sites with water chemistry needed to support sea water adaptation of smolts; and

(xiii) Freshwater and marine sites with diverse, abundant assemblages of native fish communities to enhance survivorship as Atlantic salmon smolts emigrating through the estuary.

(4) *Exclusion of Indian lands.* Critical habitat does not include occupied habitat areas on Passamaquoddy Tribal Indian lands within the range of the GOM DPS. Critical habitat does include occupied habitat on Penobscot Tribal lands within the range of the GOM DPS. The Indian lands specifically excluded from critical habitat are those defined in the Secretarial Order 3206, including:

(i) Lands held in trust by the United States for the benefit of any Indian Tribe;

(ii) Lands held in trust by the United States for the benefit of any Indian Tribe or individual subject to restrictions by the United States against alienation;

(iii) Fee lands, either within or outside the reservation boundaries, owned by the tribal government; and

(iv) Fee lands within the reservation boundaries owned by individual Indians. We have determined that the rivers, streams, lakes, and estuaries of 9,571 acres (38.7 sq km) of tribal land within the areas occupied by the GOM DPS are excluded from critical habitat designation based on the principles of the Secretarial Order discussed above. Per request of the Penobscot Nation, 55,180 acres (223 sq km) of the Penobscot Nation lands are included as critical habitat.

(5) *Areas that do not meet the definition of critical habitat under section 4(a)(3)(B)(i).* Critical habitat does not include the following areas owned or controlled by the Department of Defense, or designated for its use, that are subject to an integrated natural resources management plan prepared under section 101 of the Sikes Act (16 U.S.C. 670a). These areas that are not included are:

(i) The 435 acres (1.8 sq km) of the Brunswick Naval Air Station in Brunswick Maine within the Little Androscoggin HUC 10 watershed in the Merrymeeting Bay SHRU; and

(ii) The 5,328 acres (21.5 sq km) of the Brunswick Naval Air Stations cold weather survival, evasion, resistance, and escape school within the Sandy River HUC 10 watershed in the Merrymeeting Bay SHRU.

(6) *Areas excluded under ESA Section 4(b)(2).* (i) The 396 acres (1.6 sq km) of the Great Pond Outdoor Adventure Center in the Graham Lake HUC 10 watershed in the Downeast Coastal SHRU;

(ii) The 3,000 acres (12.1 sq km) of the Naval Computer and Telecommunications Area Master Station Atlantic Detachment in the Roques Bluffs Coastal HUC 10 in the Downeast Coastal SHRU;

(iii) The Bath Iron Works ship building facility that provides the design, building, and support of complex Navy warships, including AEGIS Class Destroyers. The excluded area extends from U.S. Route 1 bridge over the Kennebec River down river to 50 feet below the south side of BIWs dry dock, but does not include any portion of Hanson Bay or the thoroughfare between Hanson Bay and the Kennebec River. The specific area excluded from designation lies within a box between four points with the following coordinates: Point 1: N43 54′39.8″, W069 48′43.5″; Point 2: N43 54′40″, W069 48′17.8″; Point 3: N43 54′0.0″, W069 48′47″; Point 4: N43 54′0.0″, W069 48′28″;

(iv) The Belfast Bay HUC 10 Watershed (HUC 105000218);

(v) The Passadumkeag River HUC 10 Watershed (HUC 102000503); and

(vi) The Molunkus Stream HUC 10 Watershed (HUC102000306).

(7) *Description of critical habitat.* Critical habitat is designated to include the areas defined in the following hydrological units in the three SHRUs with the exception of those particular areas specifically identified:

(i) Downeast Coastal SHRU. Critical habitat area (in sq km), areas excluded under ESA section 4(b)(2) (in sq km), and exclusion type, by HUC 10 watersheds:

Sub-basin	HUC 10 code	HUC 10 watershed name	Critical habitat		Excluded areas [type]*	
			River, stream and estuary (km)	Lake (sq. km)	River, stream and estuary (km)	Lake (sq. km)
Coastal Washington Hancock sub-basin.	0105000201	Dennys River	218	45		
	0105000203	Grand Manan Channel	641	15.5		
	0105000204	East Machias River	575	70	16 [T]	0.1 [T]
	0105000205	Machias River	991	58		
	0105000206	Roque Bluffs Coastal	321	.9	13(M)	.004(M)
	0105000207	Chandler River	154	0.1		
	0105000208	Pleasant River	325	6.5		
	0105000209	Narraguagus River	573	15.5		
	0105000210	Tunk Stream	117	14		
	0105000212	Graham Lake	974	121	2.3(M)	.2(M)
	0105000213	Union River Bay	303	18		
	0105000211	Bois Bubert Coastal.				
	0105000214	Lamoine Coastal.				
	0105000215	Mt. Desert Coastal.				

* Exclusion types: [E] = Economic, [M] = Military, and [T] = Tribal—considered unoccupied at the time of listing.

(ii) Penobscot Bay SHRU. Critical habitat area (in sq km), areas excluded under ESA section 4(b)(2) (in sq km), and exclusion type, by HUC 10 watersheds:

Sub-basin	HUC 10 code	HUC 10 watershed name	Critical habitat		Excluded Areas [Type]*	
			River, stream and estuary (km)	Lake (sq. km)	River, stream and estuary (km)	Lake (sq. km)
East Branch Penobscot sub-basin.	0102000202	Grand Lake Matagamon	326	30		
	0102000203	East Branch Penobscot River (2)	179	3		
	0102000204	Seboeis River	418	31		
	0102000205	East Branch Penobscot River (3)	588	5		
	0102000201	Webster Brook.				
West Branch Penobscot sub-basin.	0102000101	North Branch Penobscot River.				
	0102000102	Seeboomook Lake.				
	0102000103	W. Br. Penobscot R. at Chesuncook.				
	0102000104	Caucomgomok Lake.				
	0102000105	Chesuncook Lake.				
	0102000106	Nesowadnehunk Stream.				
	0102000107	Nahamakanta Stream.				
	0102000108	Jo-Mary Lake.				
	0102000109	West Branch Penobscot River (3).				
	0102000110	West Branch Penobscot River (4).				
Mattawamkeag River sub-basin.	0102000301	West Branch Mattawamkeag River	657	22		
	0102000302	East Branch Mattawamkeag River	315	12		
	0102000303	Mattawamkeag River (1)	192	0.5		
	0102000305	Mattawamkeag River (2)	451	8		
	0102000307	Mattawamkeag River (3)	226	3		
	0102000306	Molunkus Stream	0	0	438 [E]	11 [E]
	0102000304	Baskahegan Stream.				
Piscataquis River sub-basin.	0102000401	Piscataquis River (1)	762	15		
	0102000402	Piscataquis River (3)	382	6		
	0102000404	Pleasant River	828	17		
	0102000405	Seboeis Stream	312	36	8.2 [T]	0.03 [T]
	0102000406	Piscataquis River (4)	328	30		
	0102000403	Sebec River.				
Penobscot River sub-basin.	0102000501	Penobscot River (1) at Mattawamkeag	292	7		
	0102000502	Penobscot River (2) at West Enfield	551	29	3 [T]	
	0102000503	Passadumkeag River	0	0	583 [E]	79 [E]
	0102000505	Sunkhaze Stream	177	0.5		
	0102000506	Penobscot River (3) at Orson Island	211	0.5		
	0102000507	Birch Stream	120	1		
	0102000509	Penobscot River (4) at Veazie Dam	225	10		
	0102000510	Kenduskeag Stream	420	1.5		
	0102000511	Souadabscook Stream	341	5.5		
	0102000512	Marsh River	319	3		
	0102000513	Penobscot River (6)	514	29		
	0102000504	Olamon Stream.				
	0102000508	Pushaw Stream.				
Penobscot Bay sub-basin.	0105000218	Belfast Bay	....	....	177 [E]	9 [E]
	0105000219	Ducktrap River	76	4		
	0105000216	Bagaduce River.				
	0105000217	Stonington Coastal.				
	0105000220	West Penobscot Bay Coastal.				

* Exclusion types: [E] = Economic, [M] = Military, and [T] = Tribal—considered unoccupied at the time of listing.

(iii) Merrymeeting Bay SHRU. Critical habitat area (in sq km), areas excluded under ESA section 4(b)(2) (in sq km), and exclusion type, by HUC 10 watershed:

Sub basin	HUC 10 code	HUC 10 watershed name	Critical habitat		Excluded areas [type] *	
			River, stream and estuary (km)	Lake (sq. km)	River, stream and estuary (km)	Lake (sq. km)
Kennebec River above the Forks sub-basin.	0103000101	South Branch Moose River.				
	0103000102	Moose River (2) above Attean Pond.				
	0103000103	Moose River (3) at Long Pond.				
	0103000104	Brassua Lake.				
	0103000105	Moosehead Lake.				
	0103000106	Kennebec River (2) above The Forks.				
Dead River sub-basin	0103000201	North Branch Dead River.				
	0103000202	South Branch Dead River.				
	0103000203	Flagstaff Lake.				
	0103000204	Dead River.				
Merrymeeting Bay sub-basin.	0103000305	Sandy River	1,215	15.8	12 [M]	0.2 [M]
	0103000306	Kennebec River at Waterville Dam	794	14		
	0103000312	Kennebec River at Merrymeeting Bay	621	22		
	0103000310	Messalonskee Stream.				
	0103000301	Kennebec River (4) at Wyman Dam.				
	0103000302	Austin Stream.				
	0103000303	Kennebec River (6).				
	0103000304	Carrabassett River.				
	0103000307	Sebasticook River at Pittsfield.				
	0103000308	Sebasticook River (3) at Burnham.				
	0103000309	Sebasticook River (4) at Winslow.				
	0103000311	Cobbosseecontee Stream.				
Upper Androscoggin sub-basin.	0104000101	Mooselookmeguntic Lake.				
	0104000102	Umbagog Lake Drainage.				
	0104000103	Aziscohos Lake Drainage.				
	0104000104	Magalloway River.				
	0104000105	Clear Stream.				
	0104000106	Middle Androscoggin River.				
Lower Androscoggin sub-basin.	0104000210	Little Androscoggin River	549	10.5	1 [M]	
	0104000201	Gorham-Shelburne Tributaries.				
	0104000202	Androscoggin River at Rumford Point.				
	0104000203	Ellis River.				
	0104000204	Ellis River.				
	0104000205	Androscoggin River above Webb River.				
	0104000206	Androscoggin River at Riley Dam.				
	0104000207	Androscoggin River at Nezinscot River.				
	0104000208	Nezinscot River.				
	0104000209	Androscoggin R. above L. Andro. R.				
Coastal Drainages East of Small Point sub-basin.	0105000301	St. George River	624	32		
	0105000302	Medomak River	318	6		
	0105000305	Sheepscot River	553	19		
	0105000306	Sheepscot Bay	220	2		
	0105000307	Kennebec River Estuary	275	3.5	1 [M]	
	0105000303	Johns Bay.				
	0105000304	Damariscotta River.				

* Exclusion types: [E] = Economic, [M] = Military, and [T] = Tribal—considered unoccupied at the time of listing.

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