Omnibus Essential Fish Habitat Amendment 2

Amendment 14 to the Northeast Multispecies FMP
Amendment 14 to the Atlantic Sea Scallop FMP
Amendment 4 to the Monkfish FMP
Amendment 3 to the Atlantic Herring FMP
Amendment 2 to the Red Crab FMP
Amendment 2 to the Skate FMP
Amendment 3 to the Atlantic Salmon FMP

Essential Fish Habitat and Habitat Area of Particular Concern Designation Alternatives DRAFT: June 2012

Prepared by the
New England Fishery Management Council

Notes about this document:
These EFH and HAPC alternatives were developed by the Habitat PDT and Committee between 2004 and 2007, and substantially approved by the Council in June 2007. The Habitat PDT made minor updates to some of the EFH maps and text descriptions during 2010 and 2011, and these changes were approved by the Committee. The updated versions, not the 2007 draft EIS versions, are included here. A few additional updates are pending. All of these alternatives will receive final Council review and approval when the entire EFH Omnibus Amendment is complete. If you have questions about any of these alternatives, please contact Michelle Bachman at mbachman@nefmc.org or 978-465-0492 x 120.

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1.0Alternatives to designate Essential Fish Habitat

Essential fish habitat (EFH) means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: ''Waters'' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; ''substrate'' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; ''necessary'' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and ''spawning, breeding, feeding, or growth to maturity'' covers a species' full life cycle.

According to the EFH Final Rule (50 CFR Part 600.815(a)(1)(i)), FMPs must consider and include the following components with respect to the designation of EFH:

1. Describe and identify EFH in text that clearly states the habitats or habitat types determined to be EFH for each life stage of the managed species.
2. Explain the physical, biological, and chemical characteristics of EFH and, if known, how these characteristics influence the use of EFH by the species/life stage.
3. Identify the specific geographic location or extent of habitats described as EFH. FMPs must include maps of the geographic locations of EFH or the geographic boundaries within which EFH for each species and life stage is found.

To summarize the life history information necessary to understand the relationship of each species and life history stage to, or its dependence on, various habitats, using text, tables, and figures, as appropriate, the Council developed EFH text descriptions for each species and life stage. As part of the process of developing these descriptions, the Council created supplemental tables (provided in Appendix B) that include all the relevant habitat-related information that was compiled for each species and life stage. The tables summarize all available information on environmental and habitat variables that limit the distribution and abundance of each species and life stage, with some additional information on ecological factors affecting reproduction, growth, and survival. Sources of information are listed under each table in Appendix B: much of the information was derived from analyses of trawl survey data in the NMFS EFH Source Document series and in a number of recent revisions and update memos, and in various state trawl survey reports. Other information was obtained from publications such as Colette and Klein-MacPhee's Fishes of the Gulf of Maine (2002). For those species and life stages with distributions that extend beyond the edge of the continental shelf (400 meters), the proposed EFH descriptions also refer to a maximum depth on the continental slope where there was evidence that the species and life stage in question is

present (level 1 information).[1] EFH on the continental shelf and in inshore coastal areas was described using level 2 relative abundance information available in the EFH source documents and the other publications identified in Appendix B. Supplementary information on primary prey consumed by each species and life stage and spawning times and locations is also presented in Appendix B, but was not included in the proposed text descriptions.[2]

In addition to the text descriptions, FMPs must include maps that display, within the constraints of available information, the geographic boundaries within which EFH for each species and life stage is defined. These maps help users to distinguish EFH from non-EFH areas. The Council followed the guidance provided by the NEFSC Habitat Evaluation Review Committee (July 2005) in the development of methods to map EFH to the extent possible. In following this guidance, EFH map alternatives developed for this amendment were primarily generated using relative abundance GIS data from fishery-independent surveys, and, for most benthic life stages, fall and spring habitat "layers" defined by depth and bottom temperature.[3] Additional EFH areas were added to the maps for some deep-water species on the continental slope based on available maximum depth data and geographic range information.

For the portion of the continental shelf surveyed by NMFS, maps for each species and life stage were based on four different percentiles (50, 75, 90 and 100) of the average catch rates (numbers per tow) for individual ten minute "squares" of latitude and longitude.[4] For the inshore coastal areas surveyed by the states, any ten minute square in which 10% or more of the tows made in that square caught at least one fish of that species and life stage was added to the map. Also included in the maps were certain coastal estuaries and embayments where a life stage of a managed species was identified as being "common" or "abundant" by NOAA's Estuarine Living Marine Resource (ELMR) Program.[5] All ELMR areas that were identified as EFH in the proposed designations were mapped using the original salinity zone boundaries, not according to the ten minute square representations that were used in the status quo maps and in the

[1] For purposes of this document, the edge of the continental shelf is defined as 400 meters because the NMFS trawl survey is mostly conducted in depths shallower than that depth.
[2] Information on prey and temperature and salinity ranges was included in the text descriptions for each alternative in the DEIS of this amendment, but removed in the FEIS.
[3] The original EFH maps for some species and life stages selected by the Council in the DEIS also included substrate data layers; these added very little useful information and were removed from the final maps.
[4] Each ten minute square covers approximately 75 square nautical miles; the actual area varies slightly according to latitude (larger near the equator and smaller near the poles).
[5] ELMR information was also included as a component in the status quo EFH designations maps; for a few species, areas where they were rare were also included.

maps approved for inclusion in the DEIS.[6] A major distinguishing feature of all of the action alternatives considered by the Council was the use of a new data transformation to compute the average catch rates for the NMFS trawl and dredge surveys in each ten minute square.[7]

Three other important changes were made in processing the NMFS survey data: 1) tows made in poorly-sampled survey strata located south of Cape Hatteras and on the Scotian Shelf and Browns Bank (in Canada) were excluded from the analysis; 2) 1963-1967 fall survey data were removed in order to standardize the fall and spring survey data to a common time period (1968-2005); and 3) the survey data were re-defined to only include areas in Canada that were considered to be part of the Gulf of Maine, or areas which represented areas occupied by transboundary (U.S. and Canada) stocks (see Appendix A for details).[8]

To be clear, the EFH designations for a particular species include both a text description and a map representation. An area is only considered EFH if it matches the text description and is located within the mapped area. Thus, the two components of EFH must be used in conjunction with one another when applying EFH designations to fishery management, EFH consultation, or other questions. For a more detailed explanation of the methods employed in generating the EFH text descriptions and maps, refer to the EFH Designation Methods Appendix A.

The original DEIS document for Phase 1 of the EFH Omnibus Amendment contained between three and five different alternatives for each species and life stage, in addition to a no action/status quo alternative, with different sets of alternatives for deep-sea red crab and Atlantic salmon. This document includes all the EFH alternatives (maps and text descriptions) that were approved by the Council in June 2007, as subsequently modified by the PDT, as well as new alternative maps that were selected as preferred by the Habitat Committee at subsequent meetings on March 10, 2011, other dates. A full set of maps that were approved by the Council in June 2007 (before they were modified by

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[6] The salinity zone boundaries used in the proposed EFH maps are the same as those shown in an appendix to the 1998 Omnibus EFH Amendment 1; the ten minute square versions were added as one component in the "master" EFH maps that are in the main document.

[7] Compared to the transformation used to create the status quo EFH maps, the new transformation further reduces the affect of occasional high catches on the average catch rate for a ten minute square and shifts squares into the "upper" end of the distribution, i.e., into higher percentiles where the average catch rates are lower. The new transformation was not applied to the historical MARMAP egg and larval data, i.e., no new egg and larval EFH maps were made.

[8] These are significant changes because the original data calculations included all the 1963-1997 fall and spring survey tow data, regardless of where the tows were made, and because the percentiles were originally calculated using all the data, then all ten minute squares, or portions thereof, in Canada were manually removed from the maps.

the PDT) are available in an appendix. For alternatives rejected during Phase 1, readers should refer to the Phase 1 DEIS.[9]

The following EFH designations are in alphabetical order by species common name. For each species, there is some introductory text that describes the methods and data sources used to designate EFH for each life stage, how the proposed designations – as modified by the PDT - differ from the status quo designations (e.g., in terms of the spatial extent, depth ranges, and substrate types that characterize EFH), and, if applicable from the designations that were approved in 2007. The text descriptions for eggs, larvae, juveniles, and adults follow this introduction.

In the status quo text descriptions, EFH was described for a separate "spawning adult" life stage; in the proposed descriptions, any information specific to spawning adults has been incorporated into the adult life stage descriptions. Also, there is no longer any information relating to seasonal occurrence in the text descriptions. In some cases, there is no text designation for the egg or larval stage because this stage does not exist for the species. The map representations, of which there may be one to four, depending on the species, follow the text descriptions. In some cases, EFH for more than one life stage was shown on the same map. This was usually done because there was insufficient survey information available for a particular life stage and so distributional data for a different life stage was used as a "proxy" for the life stage in question.

Essential fish habitat (EFH) means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity. For the purpose of interpreting the definition of essential fish habitat: ''Waters'' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; ''substrate'' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; ''necessary'' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and ''spawning, breeding, feeding, or growth to maturity'' covers a species' full life cycle.

According to the EFH Final Rule (50 CFR Part 600.815(a)(1)(i)), FMPs must consider and include the following components with respect to the designation of EFH:

4. Describe and identify EFH in text that clearly states the habitats or habitat types determined to be EFH for each life stage of the managed species.

[9] Some of the maps in the original Phase DEIS are incorrect and do not represent alternatives that the Council approved in 2007. The correct maps are included in the appendix (before modification) and in this document (after modification).

5. Explain the physical, biological, and chemical characteristics of EFH and, if known, how these characteristics influence the use of EFH by the species/life stage.
6. Identify the specific geographic location or extent of habitats described as EFH. FMPs must include maps of the geographic locations of EFH or the geographic boundaries within which EFH for each species and life stage is found.

To summarize the life history information necessary to understand the relationship of each species and life history stage to, or its dependence on, various habitats, using text, tables, and figures, as appropriate, the Council developed EFH text descriptions for each species and life stage. As part of the process of developing these descriptions, the Council created supplemental tables (provided in Appendix B) that include all the relevant habitat-related information that was compiled for each species and life stage. The tables summarize all available information on environmental and habitat variables that limit the distribution and abundance of each species and life stage, with some additional information on ecological factors affecting reproduction, growth, and survival. Sources of information are listed under each table in Appendix B: much of the information was derived from analyses of trawl survey data in the NMFS EFH Source Document series and in a number of recent revisions and update memos, and in various state trawl survey reports. Other information was obtained from publications such as Colette and Klein-MacPhee's Fishes of the Gulf of Maine (2002). For those species and life stages with distributions that extend beyond the edge of the continental shelf (400 meters), the proposed EFH descriptions also refer to a maximum depth on the continental slope where there was evidence that the species and life stage in question is present (level 1 information).[10] EFH on the continental shelf and in inshore coastal areas was described using level 2 relative abundance information available in the EFH source documents and the other publications identified in Appendix B. Supplementary information on primary prey consumed by each species and life stage and spawning times and locations is also presented in Appendix B, but was not included in the proposed text descriptions.[11]

In addition to the text descriptions, FMPs must include maps that display, within the constraints of available information, the geographic boundaries within which EFH for each species and life stage is defined. These maps help users to distinguish EFH from non-EFH areas. The Council followed the guidance provided by the NEFSC Habitat Evaluation Review Committee (July 2005) in the development of methods to map EFH to the extent possible. In following this guidance, EFH map alternatives developed for this amendment were primarily generated using relative abundance GIS data from

[10] For purposes of this document, the edge of the continental shelf is defined as 400 meters because the NMFS trawl survey is mostly conducted in depths shallower than that depth.
[11] Information on prey and temperature and salinity ranges was included in the text descriptions for each alternative in the DEIS of this amendment, but removed in the FEIS.

fishery-independent surveys, and, for most benthic life stages, fall and spring habitat "layers" defined by depth and bottom temperature.[12] Additional EFH areas were added to the maps for some deep-water species on the continental slope based on available maximum depth data and geographic range information.

For the portion of the continental shelf surveyed by NMFS, maps for each species and life stage were based on four different percentiles (50, 75, 90 and 100) of the average catch rates (numbers per tow) for individual ten minute "squares" of latitude and longitude.[13] For the inshore coastal areas surveyed by the states, any ten minute square in which 10% or more of the tows made in that square caught at least one fish of that species and life stage was added to the map. Also included in the maps were certain coastal estuaries and embayments where a life stage of a managed species was identified as being "common" or "abundant" by NOAA's Estuarine Living Marine Resource (ELMR) Program.[14] All ELMR areas that were identified as EFH in the proposed designations were mapped using the original salinity zone boundaries, not according to the ten minute square representations that were used in the status quo maps and in the maps approved for inclusion in the DEIS.[15] A major distinguishing feature of all of the action alternatives considered by the Council was the use of a new data transformation to compute the average catch rates for the NMFS trawl and dredge surveys in each ten minute square.[16]

Three other important changes were made in processing the NMFS survey data: 1) tows made in poorly-sampled survey strata located south of Cape Hatteras and on the Scotian Shelf and Browns Bank (in Canada) were excluded from the analysis; 2) 1963-1967 fall survey data were removed in order to standardize the fall and spring survey data to a common time period (1968-2005); and 3) the survey data were re-defined to only include areas in Canada that were considered to be part of the Gulf of Maine, or areas which

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[12] The original EFH maps for some species and life stages selected by the Council in the DEIS also included substrate data layers; these added very little useful information and were removed from the final maps.

[13] Each ten minute square covers approximately 75 square nautical miles; the actual area varies slightly according to latitude (larger near the equator and smaller near the poles).

[14] ELMR information was also included as a component in the status quo EFH designations maps; for a few species, areas where they were rare were also included.

[15] The salinity zone boundaries used in the proposed EFH maps are the same as those shown in an appendix to the 1998 Omnibus EFH Amendment 1; the ten minute square versions were added as one component in the "master" EFH maps that are in the main document.

[16] Compared to the transformation used to create the status quo EFH maps, the new transformation further reduces the affect of occasional high catches on the average catch rate for a ten minute square and shifts squares into the "upper" end of the distribution, i.e., into higher percentiles where the average catch rates are lower. The new transformation was not applied to the historical MARMAP egg and larval data, i.e., no new egg and larval EFH maps were made.

represented areas occupied by transboundary (U.S. and Canada) stocks (see Appendix A for details).[17]

To be clear, the EFH designations for a particular species include both a text description and a map representation. An area is only considered EFH if it matches the text description and is located within the mapped area. Thus, the two components of EFH must be used in conjunction with one another when applying EFH designations to fishery management, EFH consultation, or other questions. For a more detailed explanation of the methods employed in generating the EFH text descriptions and maps, refer to the EFH Designation Methods Appendix A.

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The following EFH designations are in alphabetical order by species common name. For each species, there is some introductory text that describes the methods and data sources used to designate EFH for each life stage, how the proposed designations – as modified by the PDT - differ from the status quo designations (e.g., in terms of the spatial extent, depth ranges, and substrate types that characterize EFH), and from the designations that were approved in 2007. The text descriptions for eggs, larvae, juveniles, and adults follow this introduction.

In the status quo text descriptions, EFH was described for a separate "spawning adult" life stage; in the proposed descriptions, any information specific to spawning adults has been incorporated into the adult life stage descriptions. Also, there is no longer any information relating to seasonal occurrence in the text descriptions. In some cases, there is no text designation for the egg or larval stage because this stage does not exist for the

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[17] These are significant changes because the original data calculations included all the 1963-1997 fall and spring survey tow data, regardless of where the tows were made, and because the percentiles were originally calculated using all the data, then all ten minute squares, or portions thereof, in Canada were manually removed from the maps.

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species. The map representations, of which there may be one to four, depending on the species, follow the text descriptions. In some cases, EFH for more than one life stage was shown on the same map. This was usually done because there was insufficient survey information available for a particular life stage and so distributional data for a different life stage was used as a "proxy" for the life stage in question.

1.1 Major gadids – cod, haddock, and pollock

1.1.1 Atlantic cod

The proposed EFH maps for Atlantic cod eggs and larvae are based on the relative abundance of juvenile cod during 1968-2005 in the fall and spring NMFS trawl surveys at the 90th percentile catch level, and the relative abundance of eggs and larvae during 1978-1987 in the NMFS MARMAP ichthyoplankton surveys at the 90th percentile area level. Ten minute squares located south of 38°N latitude were not included. The proposed maps also include ten minute squares in state waters that met the 10% or more frequency of occurrence criterion for juvenile cod, those bays and estuaries identified by the NOAA ELMR program where Atlantic cod eggs or larvae were "common" or "abundant," (see Table 1). These egg and larval designations were referred to as Alternative 2E in the Phase 1 DEIS.[19] The proposed new EFH maps for Atlantic cod eggs and larvae extend further south than the status quo maps, which are limited by the distribution of juvenile cod and do not include any area south of southern New England. The new maps also include Nantucket Sound and more areas along the Maine coast than were included in the original maps.

The proposed EFH maps for juvenile and adult Atlantic cod within the NMFS trawl survey area were developed using a GIS depiction of preferred depth and bottom temperature ranges that were determined from graphical 1963-2003 spring and fall NMFS trawl survey data in Lough (2005). They are also based on average catch per tow data in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys mapped at the 90th percentile of catch level and include inshore areas where juveniles or adults were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys, and ELMR information for coastal bays and estuaries. Both maps include ten minute squares along the Maine coast that were either inadequately surveyed (fewer than four tows) or were "filled in" based on input from industry members on the Habitat Committee. The adult map also includes

[19] The 2E map for cod eggs in the DEIS is not accurate: a number of ten minute squares that were not in either of the input data sets were inadvertently filled in.

historical cod spawning grounds in coastal Gulf of Maine waters.[20] The juvenile and adult designations were referred to as 3E alternatives in the Phase 1 DEIS.[21]

The proposed new juvenile map extends over a similar geographic area as the status quo map, but only includes coastal waters in the Gulf of Maine shallower than 120 meters. Considerably more area in southern New England (e.g., Nantucket Sound) and on the southern portion of Georges Bank has been added. A few scattered ten minute squares have also been added in the Mid-Atlantic. The proposed EFH map for adult cod is also more limited to the shallower portion of the Gulf of Maine (<160 meters) than the status quo map. It excludes a large area south of Cape Cod that is less than 30 meters deep and coastal waters off New Jersey and Delaware that were added to the original maps because of their historical importance for adult cod that migrate (or used to) that far south in the winter. Compared with the maps in the DEIS, a few ten minute squares in the outer Gulf of Maine that do not conform to the maximum depth identified as EFH for juvenile and adult cod have been removed. The most significant change in the proposed adult map is the extension of EFH on to the southern portion of Georges Bank and westward on the continental shelf into the Mid-Atlantic region.

The proposed new text descriptions include more detailed information on the wide variety of substrates utilized by juvenile and adult cod than are in the status quo descriptions. The status quo descriptions refer only to cobble or gravel, for juveniles, and rocks, pebbles, or gravel for adults; the new designations also identify biogenic features of benthic habitats (e.g., submerged aquatic vegetation and attached epifauna) that are essential for recently settled young-of-the-year juvenile cod.[22] Another important component of the proposed new EFH designation for juvenile cod is a depth range that specifically includes the intertidal zone and extends into deeper water (120 meters vs. 75 meters in the status quo description). As is true for the other managed species included in this amendment, the proposed new EFH text descriptions are much more consistent with the maps.

Text descriptions:

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[20] Ten minute squares along the Maine and New Hampshire coasts that overlap with historically important spawning grounds, as reported by Ames (2002), were added to the proposed adult EFH map; they were also added to the status quo map in 1998.

[21] In both of the maps that were approved for the DEIS in 2007 areas of historical importance that were not represented by the survey data were "filled in" by the Council's Habitat Committee. Also, the adult designation that was approved in 2007 was based on the 75th percentile of the NMFS survey data and did not include continental shelf waters in the Mid-Atlantic that are included in the new 90th percentile map that was approved in 2011.

[22] The proposed juvenile cod text description is the only one that includes some level 3 information describing habitats where growth and survival are high for the young-of-the-year.

Essential fish habitat for Atlantic cod (*Gadus morhua*) is designated anywhere within the geographic areas that are shown in Table 1 and the following maps which exhibit the environmental conditions defined in the text descriptions. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region, as shown on Map 1, and in the high salinity zones of the bays and estuaries listed in Table 1.

Larvae: Pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region, as shown on Map 2, and in the high salinity zones of the bays and estuaries listed in Table 1.

Juveniles: Intertidal and sub-tidal benthic habitats in coastal and continental shelf waters in the Gulf of Maine, southern New England, and on Georges Bank, from the shoreline (MHW) to a maximum depth of 120 meters (see Map 3), including high salinity zones in the bays and estuaries listed in Table 1. EFH for juvenile Atlantic cod includes a wide variety of substrates. Young-of-the-year juveniles settle to the bottom in inshore and offshore waters and are more abundant on sand, in seagrass and macroalgal beds, and on structurally complex hard bottom substrates (*e.g.*, rock reef and cobble–pebble–gravel habitats with attached epifauna such as sponges). Young-of-the-year growth is highest in seagrass; survival is highest in cobble and rocky reef habitats and in habitats with sufficient attached epifauna or vegetation to provide refuge from predators. Older juveniles are common on gravel and on the deeper slopes of ledges, in macroalgae.

Adults: Sub-tidal benthic habitats in coastal and continental shelf waters in the Gulf of Maine, south of Cape Cod, and on Georges Bank, to a maximum depth of 160 meters (see Map 4), including high salinity zones in the bays and estuaries listed in Table 1. EFH for adult Atlantic cod occurs on rocky, pebbly, gravelly, and sandy substrates and along rocky slopes and ledges in seaweeds. South of Cape Cod, Spawning occurs in nearshore areas and on the continental shelf, usually in depths less than 70 meters.

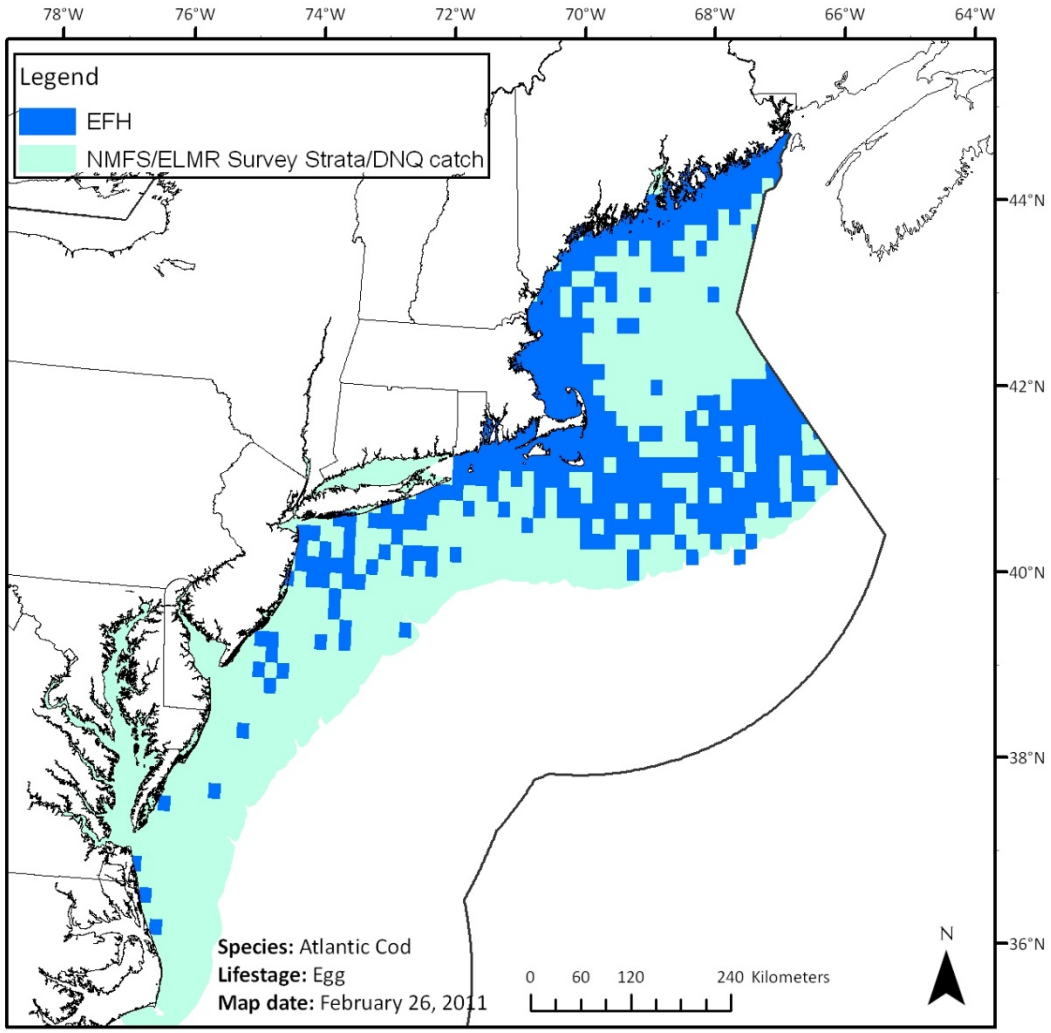
Table 1 – Atlantic cod EFH designation for estuaries and embayments.

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay		S	S	S
Englishman/Machias Bay	S	S	S	S
Narraguagus Bay	S	S	S	S
Blue Hill Bay	S	S	S	S
Penobscot Bay		S	S	S
Muscongus Bay			S	S

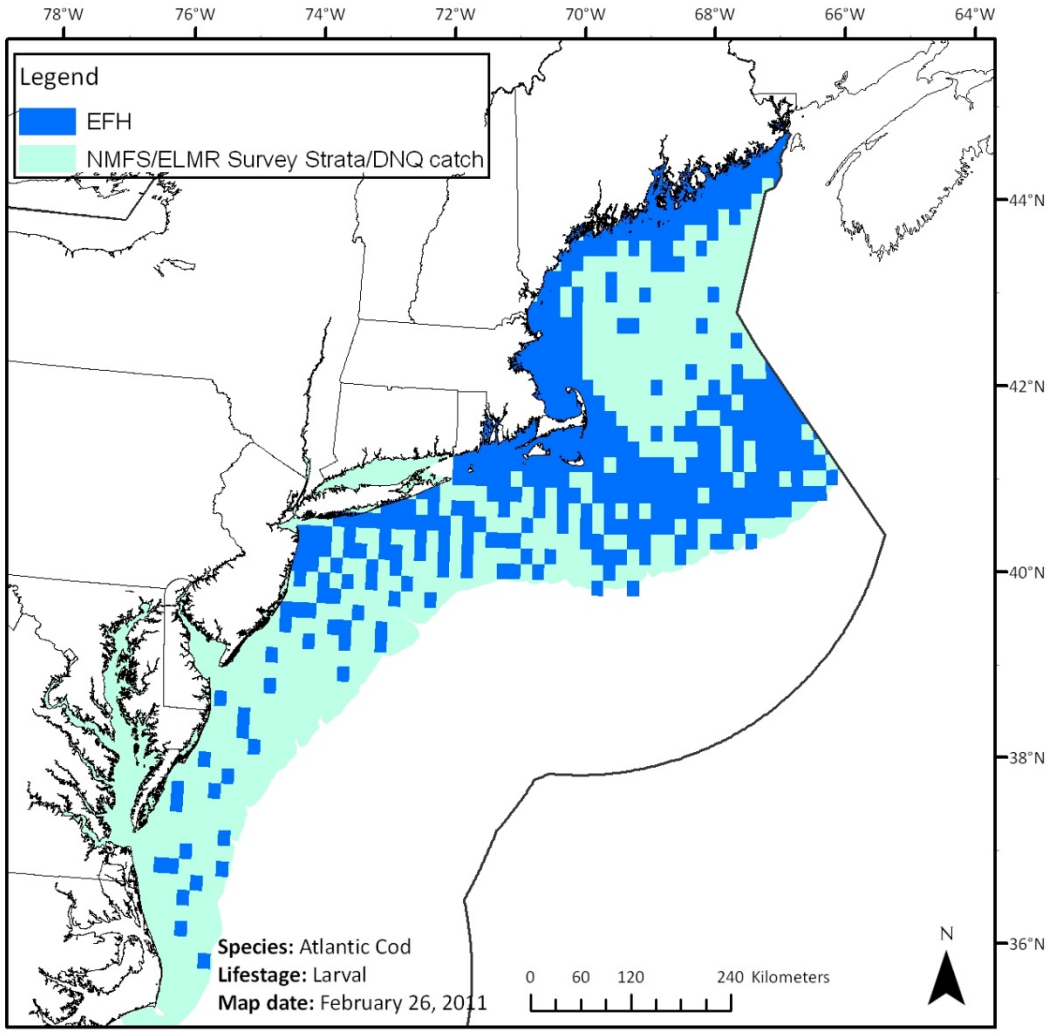
Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Damariscotta River			S	S
Sheepscot River	S	S	S	S
Kennebec / Androscoggin			S	S
Casco Bay	S	S	S	S
Saco Bay	S	S	S	S
Great Bay	S	S		
Massachusetts Bay	S	S	S	S
Boston Harbor	S	S	S,M	S,M
Cape Cod Bay	S	S	S	S
Buzzards Bay	S	S	S	S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

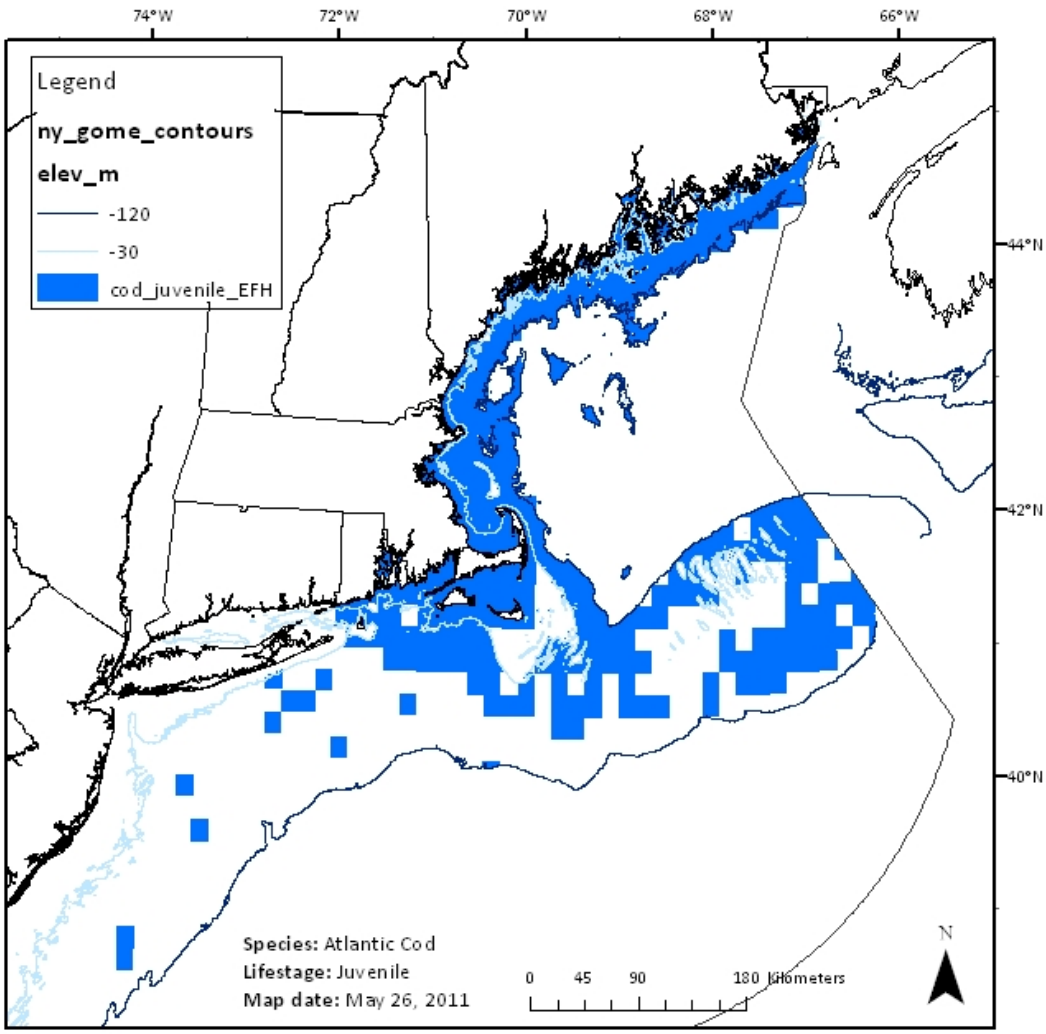
Map 1 – Atlantic cod egg EFH.



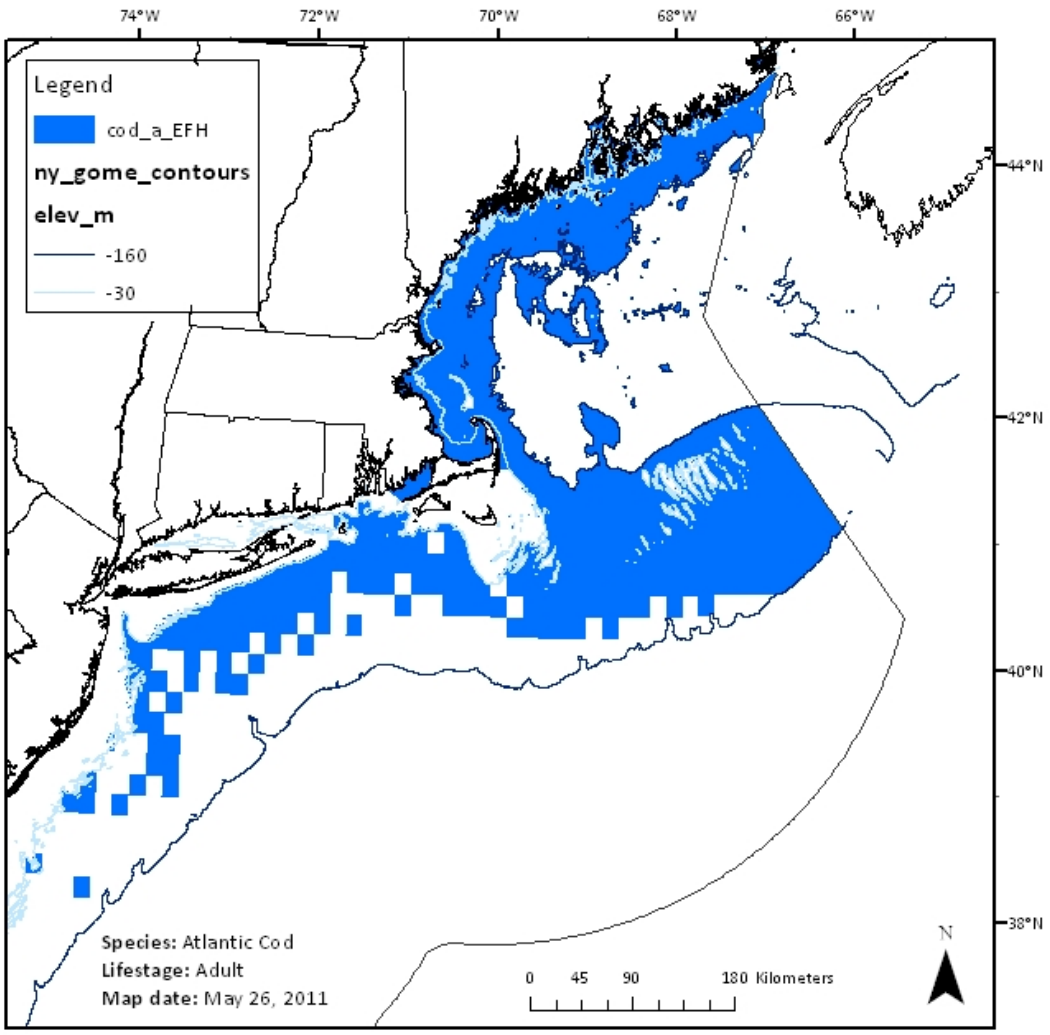
Map 2 – Atlantic cod larval EFH.



Map 3 – Atlantic cod juvenile EFH.



Map 4 – Atlantic cod adult EFH.



1.1.2 Haddock

The proposed EFH designation maps for haddock eggs and larvae differ slightly from the status quo maps. Although no new region-wide survey data have been collected since the MARMAP egg and larval surveys were conducted in 1977-1987, any ten minute squares that were "filled in" in the original maps have been removed (see explanation of the status quo mapping methodology in Appendix A). Like the no action/status quo EFH maps, the new proposed maps are based on the complete range (100th percentile) of the MARMAP survey data. The proposed designations include the coastal bays and estuaries identified by the NOAA ELMR program as supporting haddock eggs or larvae at the "rare," "common," or "abundant" level.

The proposed EFH maps for juvenile and adult haddock are based on the distributions of depth and bottom temperature that were associated with high catch rates of juveniles or adults in the 1963-2003 spring and fall NMFS trawl surveys. The proposed designations are also based on average catch per tow data for juveniles or adults in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch level. The maps include inshore areas where juvenile and adult haddock were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys, and, for the adults, ten minute squares that include historic spawning grounds, as reported by Ames (2002) (The Ames tms may not end up in the final map.). The proposed designations were 3D alternatives in the Phase 1 DEIS.

The proposed EFH text description for juveniles refers to a wider range of substrate types than the status quo description, including sand. Additional substrate information has also been added to the adult text description. Also, the maximum depth for EFH has been increased from 100 to 140 meters for the juveniles and from 150 to 160 meters for the adults. Compared to the status quo EFH map for adults, the proposed map excludes the shallow portion of Georges Bank (<50 meters) and quite a few ten minute squares that were originally designated in the outer Gulf of Maine (>160 meters), but includes considerably more area inside the 160 meter contour and along the Maine coast than was included in the original map.

For the juveniles, modifications to the depth range (maximum 140 instead of 120 m) and corrections in the mapping conventions (see XXX) resulted in the removal of a number of ten minute squares that are deeper than 140 m in the outer Gulf of Maine and the addition of some ten minute squares in the Mid-Atlantic. For the adults, using the adult survey data and habitat features (alt 3D) instead of combining the juvenile and adult data (alt 3E), then adding historic spawning grounds along the Maine coast, extending the maximum depth from 150 to 160 m, and removing ten minute squares that were deeper than 160m, greatly reduced the amount of EFH designated in the outer Gulf of Maine and east of Long Island. Also, considerably more area was filled in inside the 160 m contour in the Gulf of Maine. For the adults, these modifications caused an expansion of EFH in the inner portion of the Gulf of Maine and the removal of a large number of ten minute squares in the outer gulf that are deeper than 160 meters.

[Bottom line: mapping the 90% adult survey data and adding the Ames data achieves the same purpose as combining the juv and adult survey data, ie filling in interior GOM waters, and is a more defensible approach]. If the Ames tms are removed, EFH in inshore waters on the Maine coast will be reduced. This is probably a good thing, since min depth is 50 m, but it means there is less support for Jim Salisbury's opinion that the adult survey data are not accurately showing the presence of adult haddock in inshore waters. The problem here, if you believe the Ames report, is that haddock used to spawn in deep water in places like Pen Bay, so should if you include entire tms where

these "holes" are present, EFH extends all the way to the shoreline. The solution is to go ahead and map these areas (esp if we did for cod) and rely on the text description to define the min depth.

Text descriptions:
Essential fish habitat for haddock (Melanogrammus aeglefinus) is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 2 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Pelagic habitats in coastal and offshore waters in the Gulf of Maine, southern New England, and on Georges Bank, as shown on Map 5, and in the high salinity zones of the bays and estuaries listed in Table 2.

Larvae: Pelagic habitats in coastal and offshore waters in the Gulf of Maine, the Mid-Atlantic, and on Georges Bank, as shown as shown on Map 6, and in the high salinity zones of the bays and estuaries listed in Table 2.

Juveniles: Sub-tidal benthic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region extending to a maximum depth of 140 meters, as shown on Map 7. EFH for juvenile haddock occurs on gravel, pebbles, clay, broken shells, and smooth, hard sand, especially between rocky patches.

Adults: Sub-tidal benthic habitats in the Gulf of Maine, on Georges Bank, and in southern New England, between 50 and 160 meters, as shown on Map 8. EFH for adult haddock occurs on gravel, pebbles, clay, broken shells, and smooth, hard sand, especially between rocky patches. Haddock are not commonly found over rocks, ledges, kelp, or soft mud.

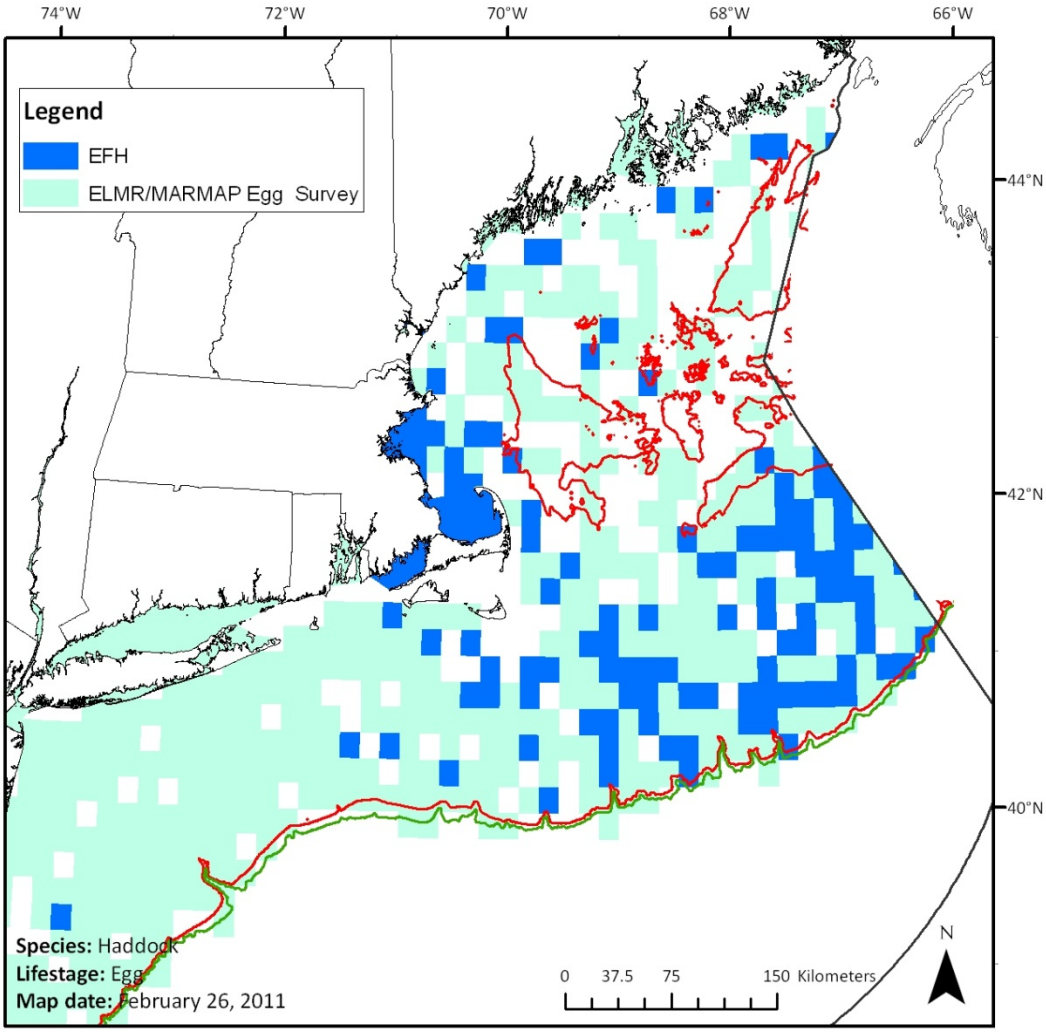
Table 2 – Haddock EFH designation for estuaries and embayments

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Great Bay	S	S		
Hampton Harbor*	S	S		
Plum Island Sound*	S	S		
Massachusetts Bay	S	S		
Boston Harbor	S	S		
Cape Cod Bay	S	S		
Buzzards Bay	S	S		
Narragansett Bay		S		

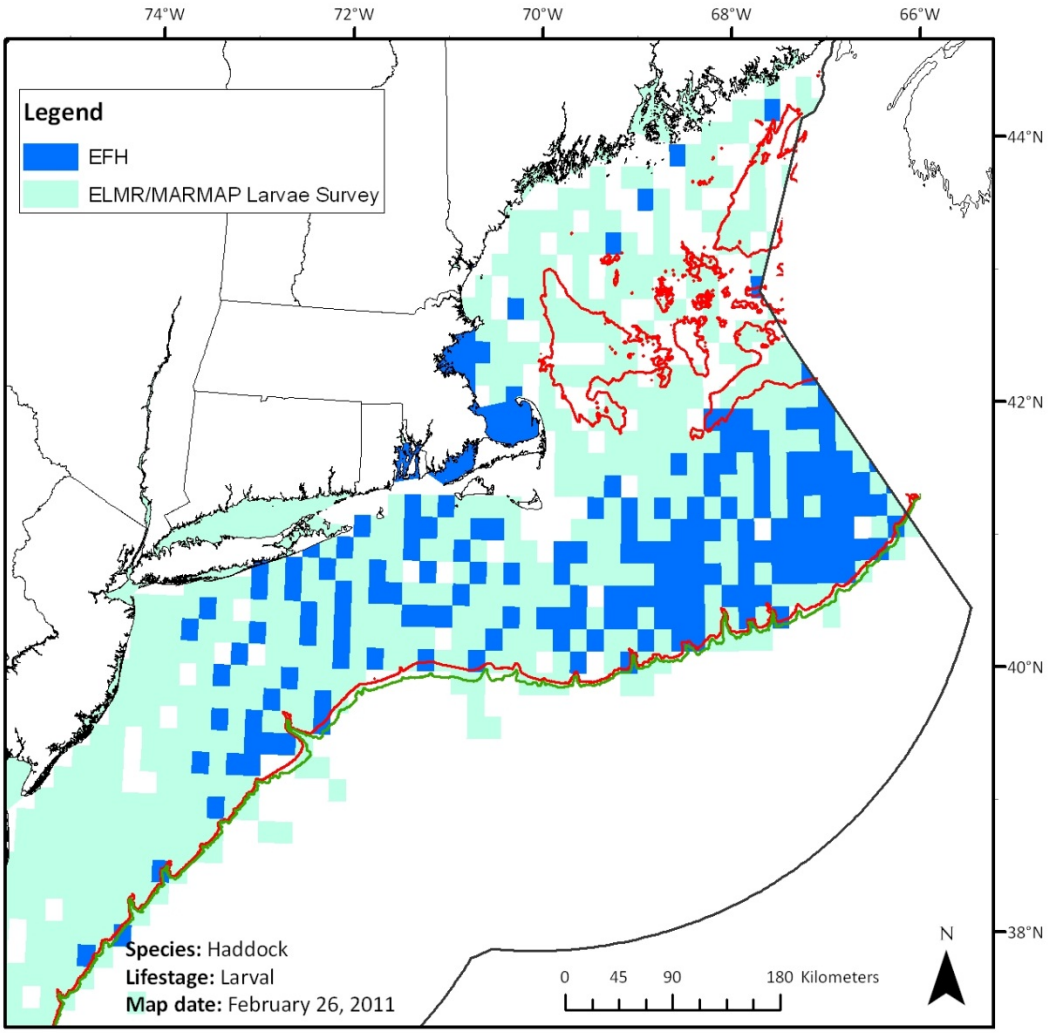
S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

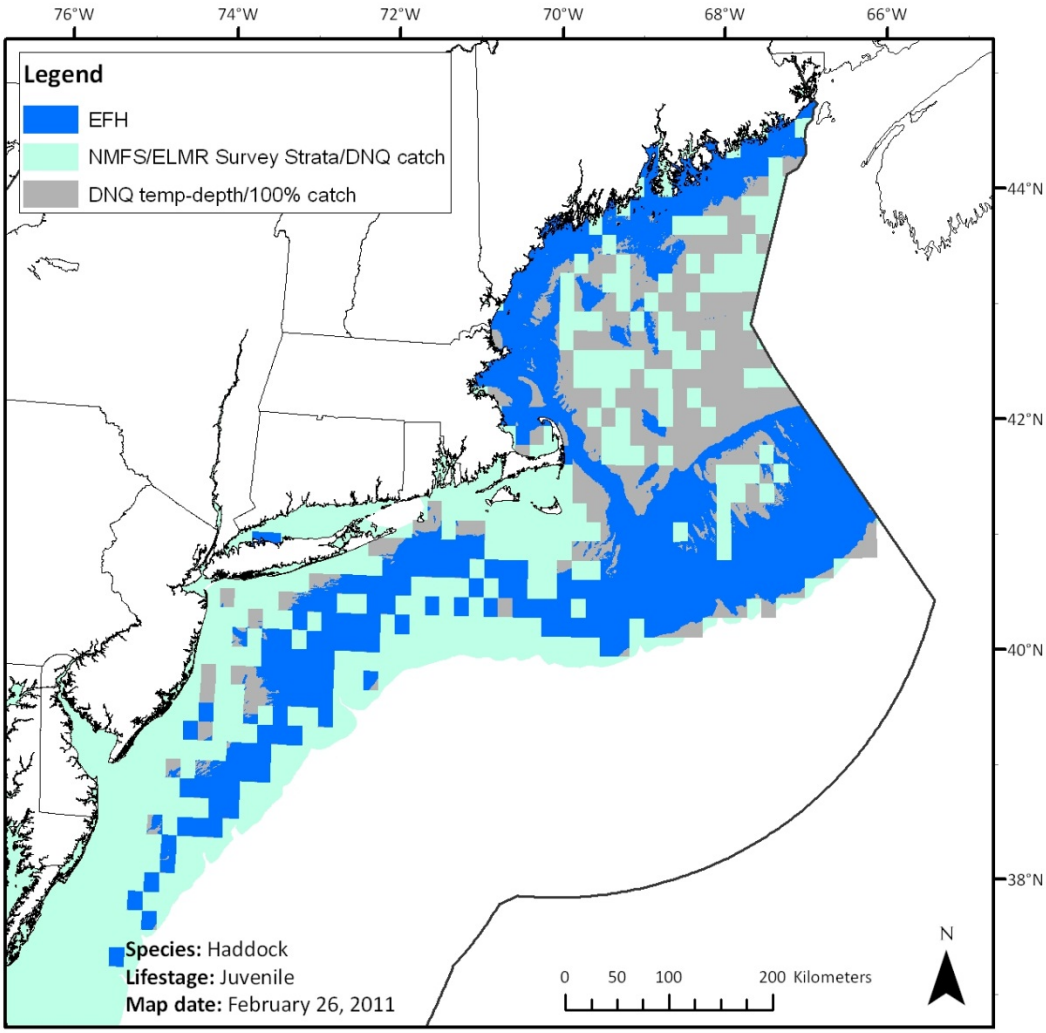
Map 5 – Haddock egg EFH.



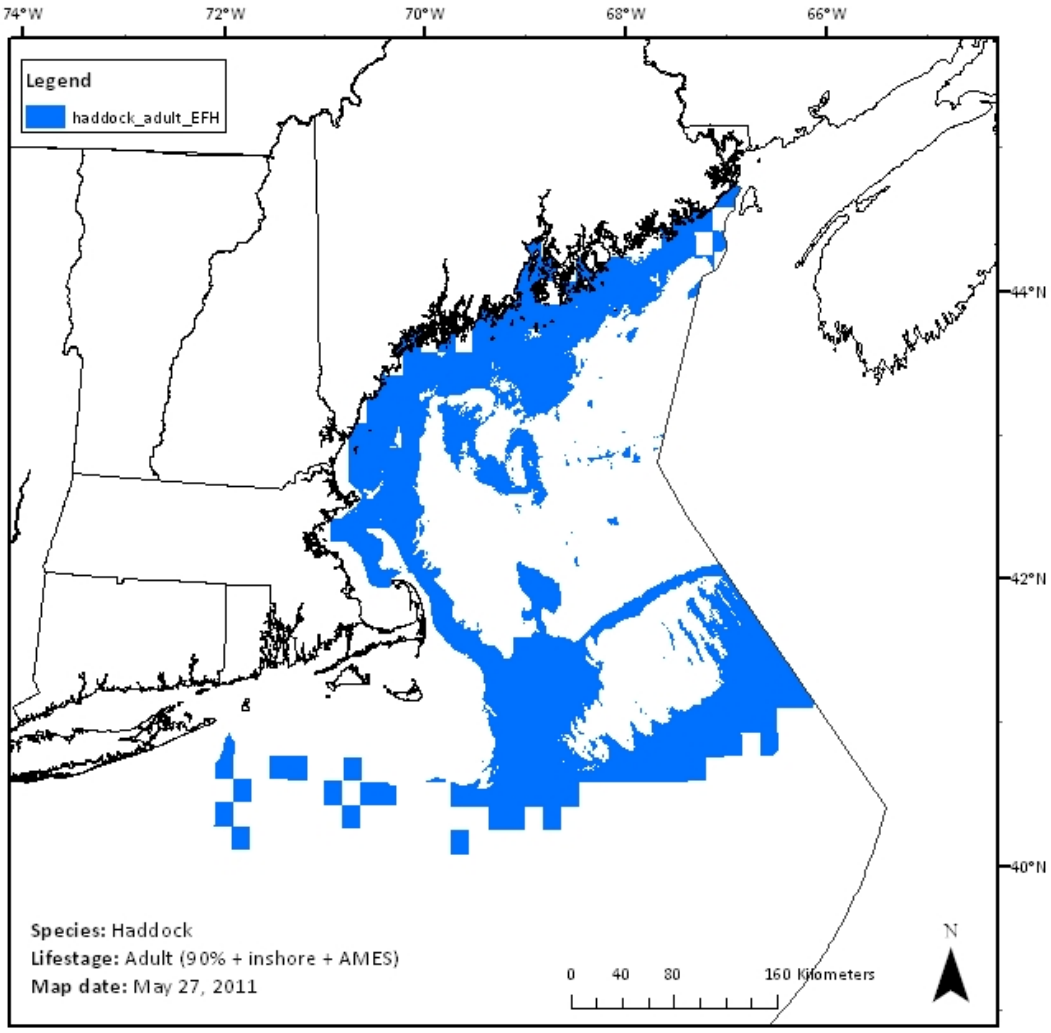
Map 6 – Haddock larval EFH.



Map 7 – Haddock juvenile EFH.



Map 8 – Haddock adult EFH.



1.1.3 Pollock

The proposed EFH maps for pollock eggs and larvae are based upon the relative abundance of adult pollock during 1968-2005 in the fall and spring NMFS trawl surveys at the 90th percentile catch level and the relative abundance of eggs and larvae, respectively, during 1978-1987 in the NMFS MARMAP ichthyoplankton surveys at the 90th percentile area level. The designations also include ten minute squares in inshore areas where adult pollock were caught in state trawl surveys in more than 10% of the tows made in individual squares, as well as those bays and estuaries identified by the NOAA ELMR program where pollock eggs or larvae, respectively, were "common" or "abundant." The proposed new egg and larval maps include a number of scattered ten minute squares on Georges Bank and in southern New England that were not included

in the maps that were approved in 2007 (see Appendix) or in the status quo maps. The new larval map would extend EFH further south into the Mid-Atlantic.[23]

The proposed EFH maps for juvenile and adult pollock were based on preferred depth and bottom temperature ranges for each life stage that were determined from graphical 1963-2003 spring and fall NMFS trawl survey data, on average catch per tow data for juveniles and adults in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch level, and on ELMR information for coastal bays and estuaries. The juvenile map also includes inshore areas where juveniles were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys.[24] These designations were referred to as 3D alternatives in the Phase 1 DEIS.

The proposed juvenile EFH map for this species looks very different than the status quo map. Because EFH in the proposed designation extends no deeper than 180 meters, deep water in the outer Gulf of Maine is no longer included in the map. Instead, much more area in the gulf that is shallower than 180 meters would now be EFH. Both the proposed and the status quo adult maps identify the outer Gulf of Maine as EFH, but the new map is restricted to depths greater than 80 meters within the NMFS survey area. It also includes a few new ten minute squares on the southern flank of Georges Bank and excludes a large area on the shelf southeast of Long Island that was added to the status quo map by the fishing industry. The high salinity zones of Long Island Sound, Cape Cod Bay, and Massachusetts Bay would remain designated areas for the juveniles and adults based on the ELMR information (see Table 3).

No revisions were made to the depth range used to create the proposed juvenile EFH map since it was approved for the DEIS, but a few ten minute squares that are deeper than 180 meters have been removed from the new map. The modified adult map is very different from the original proposed map due to the increase in the maximum depth from 180 to 300 meters, which would extend EFH into the outer Gulf of Maine.

Like the status quo text description, the proposed juvenile text description defines EFH as extending to the shoreline, but defines it explicitly to include the intertidal zone. The maximum depth for EFH is defined as 180 for the juveniles and 300 m for the adults versus 250 and 365 m in the status quo descriptions. In view of the fact that pollock use the entire water column, both of the proposed EFH descriptions refer to pelagic and benthic habitats, not just bottom habitats. A variety of substrates are described for the

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[23] The status quo designations relied on survey data for adults at the 90th percentile as a proxy for eggs, larvae, and juveniles.

[24] Very few adult pollock are caught in inshore trawl surveys, not enough to trigger the 10% frequency of occurrence threshold anywhere.

juveniles, but not for the adults because they show little preference for specific substrate types.

Text descriptions:
Essential fish habitat for pollock (*Pollachius virens*) is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 3 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Pelagic inshore and offshore habitats in the Gulf of Maine, on Georges Bank, and in southern New England, as shown on Map 9, including the bays and estuaries listed in Table 3

Larvae: Pelagic inshore and offshore habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region, as shown on Map 10, including the bays and estuaries listed in Table 3.

Juveniles: Pelagic and benthic habitats in the Gulf of Maine, on portions of Georges Bank, in Long Island Sound, and in a number of bays and estuaries north of Cape Cod (see Map 11 and Table 3). EFH for juvenile pollock occurs on a wide variety of substrates, including mud, sand, and rocky bottom with eelgrass and macroalgae, from the shoreline (including the intertidal zone) to a maximum depth of 180 meters.

Adults: Pelagic and benthic habitats in the Gulf of Maine and on the southern portion of Georges Bank between 80 and 300 meters, and in shallower sub-tidal habitats in Long Island Sound and in a few coastal embayments north of Cape Cod (see Map 12 and Table 3). Adult pollock show little preference for bottom type. They spawn over hard, stony or rocky bottom.

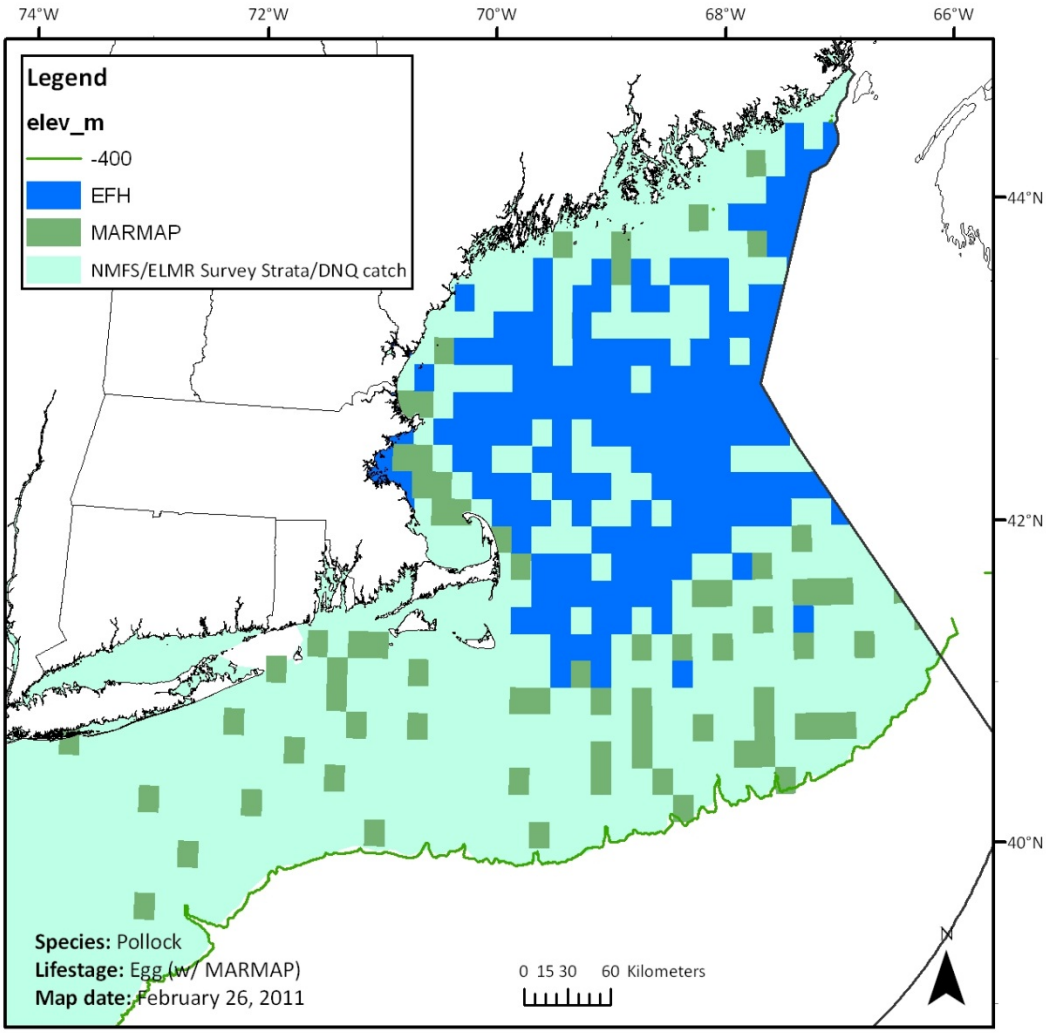
Table 3 – Pollock EFH designation for estuaries and embayments

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay		S	S,M	S
Englishman/Machias Bay			S,M	
Narraguagus Bay			S,M	
Blue Hill Bay			S,M	
Penobscot Bay			S,M	
Muscongus Bay			S,M	
Damariscotta River			S,M	S
Sheepscot River		S	S,M	
Kennebec / Androscoggin			S,M	
Casco Bay			S,M	

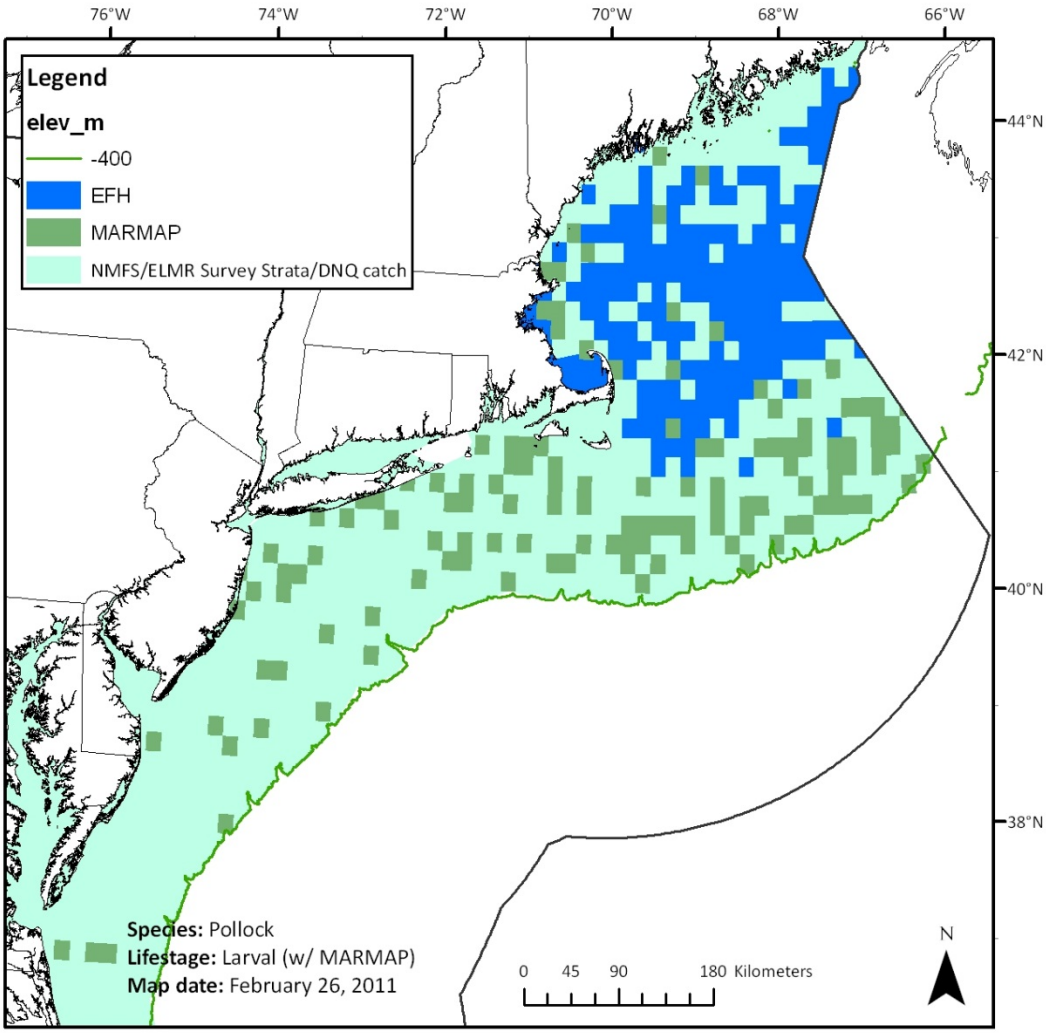
Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Saco Bay			S,M	
Great Bay	S	S	S	
Hampton Harbor*	S	S	S	
Merrimack River	M	M	M	
Plum Island Sound*	S	S	S	
Massachusetts Bay	S	S	S	S
Boston Harbor	S	S	S,M	
Cape Cod Bay		S	S	S
Waquoit Bay			S	
Long Island Sound			S	S
Great South Bay			S	

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

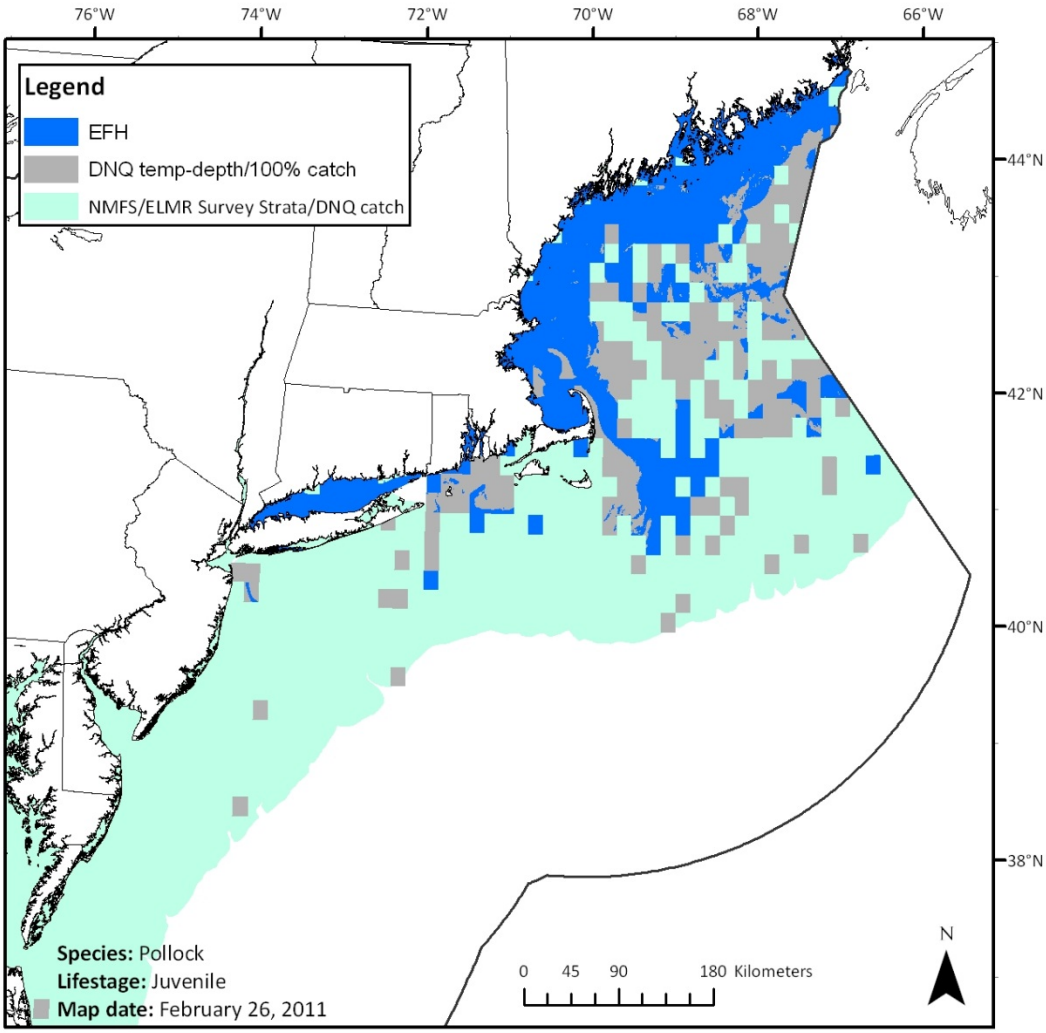
Map 9 – Pollock egg EFH.



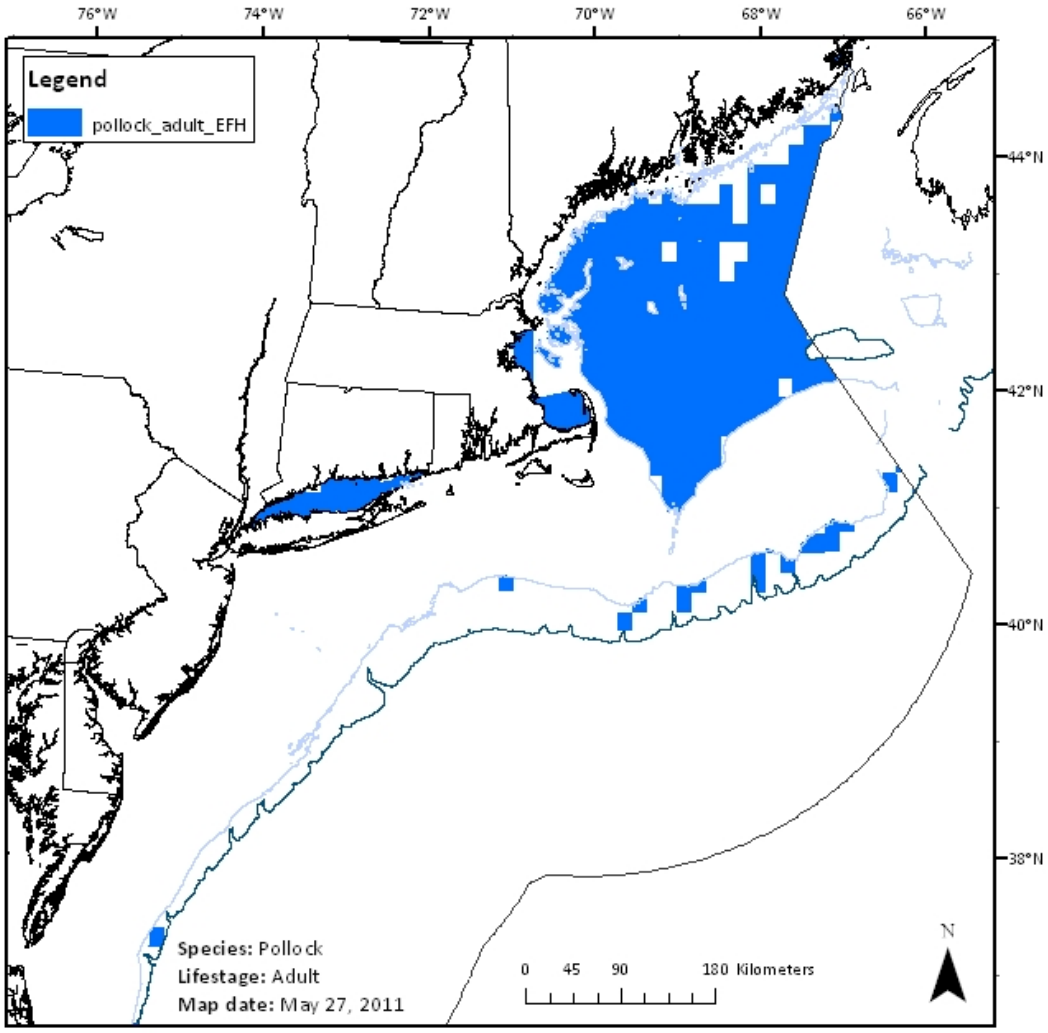
Map 10 – Pollock larval EFH.



Map 11 – Pollock juvenile EFH.



Map 12 – Pollock adult EFH. From Dave: Can we eliminate the single tms off the VA capes? Concerns expressed at March 10 HC meeting about this map, viz absence of EFH in SNE. Except for juvs on Maine coast, catch rates of pollock in trawl surveys are low and even at 100% only one tms is designated off RI. Is this a species where we should consider using other data sources, like maybe commercial catch data?



1.2 Flatfish

1.2.1 American plaice

The proposed EFH designation maps for American plaice eggs and larvae differ slightly from the status quo maps. Although no new region-wide survey data have been collected since the MARMAP egg and larval surveys were conducted in 1977-1987, any ten minute squares that were "filled in" in the original maps have been removed (see explanation of the status quo mapping methodology in Appendix A). As in the original

EFH designations, the proposed maps are based on the 75th percentile of the observed range of the MARMAP survey data (see Appendix A for an explanation of the difference between maps based on "range" or "area" and maps based on "catch"). The egg and larval EFH designations also include those bays and estuaries identified by the NOAA ELMR program as supporting American plaice eggs or larvae at the "common" or "abundant" level (see Table 4).

The proposed EFH maps for juvenile and adult American plaice within the NMFS trawl survey area were developed using a GIS depiction of preferred depth and bottom temperature ranges that were determined from graphical 1963-2003 spring and fall NMFS trawl survey data in Johnson (2005), plus average catch per tow data for each life stage in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys mapped at the 75th percentile level. They also include inshore areas where American plaice were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys, and ELMR information for coastal bays and estuaries. The 75th percentile and 10% frequency of occurrence data layers were created separately for juveniles and adults. These juvenile and adult designations were referred to as Alternative 3C in the Phase 1 DEIS.[25]

Modifications to the alternative 3 mapping procedure resulted in some minor modifications to the juvenile American plaice map that was initially approved by the Council and is in the DEIS. The major change in the adult EFH map was caused by a revision to the maximum depth, from 200 to 300 meters. As a result, deep water in the Gulf of Maine (in particular, Wilkinson Basin) is now included in the proposed EFH designation.

Compared to the status quo map (see DEIS), the proposed EFH map for juveniles excludes large areas in the outer Gulf of Maine that were included in the status quo map and are deeper than the maximum defined depth (180 m). Because the maximum depth for the adults is 300 meters, the proposed new map for the adults, like the status quo map, extends over the most of the Gulf of Maine.

The proposed EFH descriptions for juvenile and adult plaice define the preferred substrate as being mud and sand and do not include gravel, which was included in the status quo descriptions.[26] They also extend EFH for into deeper water, 180 vs. 150 meters for the juveniles and 300 vs. 175 meters for the adults. At the same time, there is no defined minimum depth for either life stage. These revisions of the EFH descriptions for juvenile and adult American plaice are more consistent with the new maps than was

[25] The preferred alternative maps for juveniles and adults in the DEIS are not the right maps.
[26] Note that American plaice have been associated with gravel substrates on the Scotian Shelf (see Appendix B), but the Council decided to rely primarily on habitat-related information that was available for U.S. waters when developing EFH text descriptions.

the case for the status quo designations. They were made in recognition of the fact that this species is common or abundant in a number of shallow-water bays and estuaries in the Gulf of Maine (see Table 4), but it is also true that juvenile and adult American plaice are not caught very often in bottom trawl surveys at depths below 40-60 and 40-80 meters, respectively (see Appendix B). The substrate information in the status quo and the proposed new text descriptions is essentially the same.

Text descriptions:
Essential fish habitat for American plaice (*Hippoglossoides platessoides*) is designated anywhere within the geographic areas that are listed in Table 4 and shown in the following maps which exhibit the environmental conditions defined in the text descriptions. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Pelagic habitats in the Gulf of Maine and on Georges Bank as shown on Map 13, including the high salinity zones of the bays and estuaries listed in Table 4.

Larvae: Pelagic habitats in the Gulf of Maine, on Georges Bank, and in southern New England, as shown on Map 14, including the high salinity zones of the bays and estuaries listed in Table 4.

Juveniles: Sub-tidal benthic habitats in the Gulf of Maine and the western portion of Georges Bank, extending to a maximum depth of 180 meters (see Map 15) and including mixed and high salinity zones in the coastal bays and estuaries listed in Table 4. EFH for juvenile American plaice occurs on sand and mud.

Adults: Sub-tidal benthic habitats in the Gulf of Maine and the western portion of Georges Bank, extending to a maximum depth of 300 meters (see Map 16) and including high salinity zones in the coastal bays and estuaries listed in Table 4 . EFH for adult American plaice occurs on sand and mud. Spawning generally occurs in depths less than 90 meters.

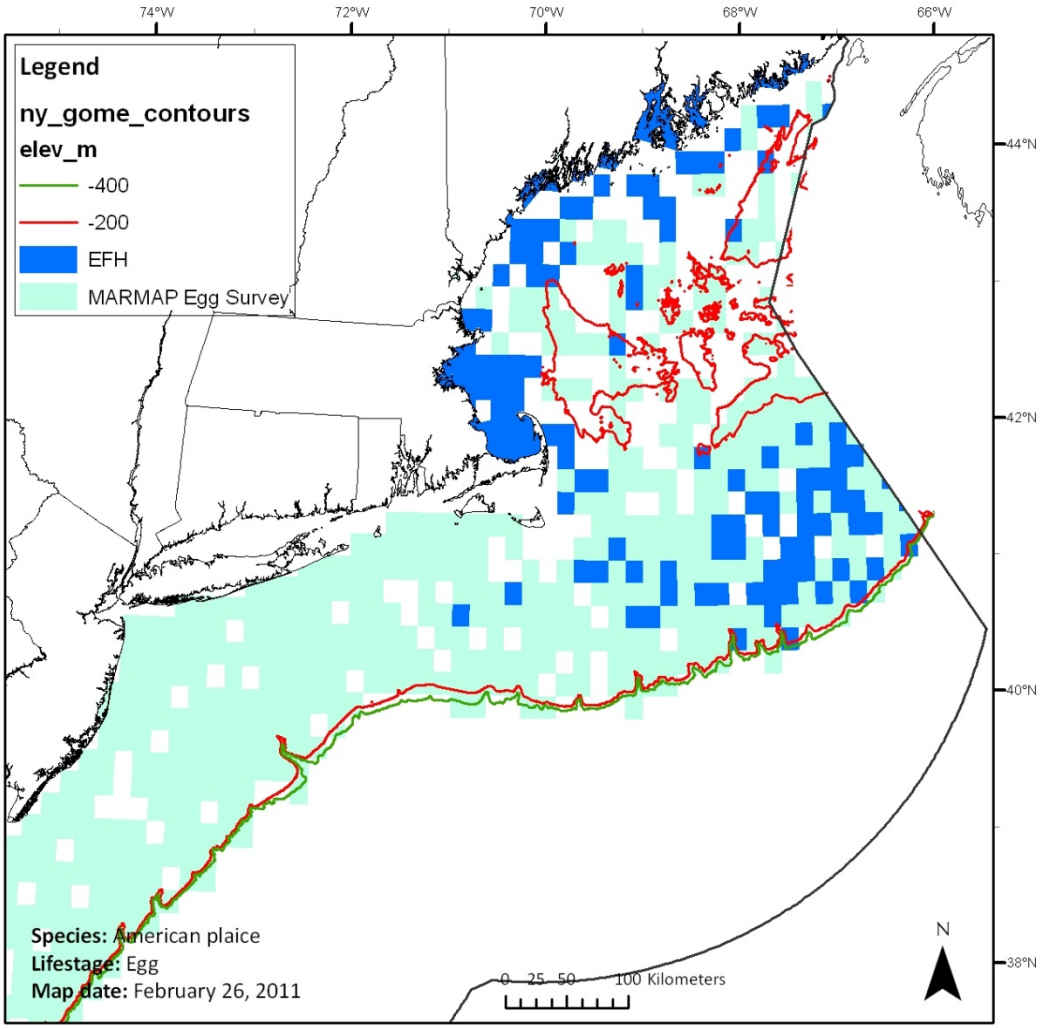
Table 4 – American plaice EFH designation for estuaries and embayments.

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay	S	S	S,M	S
Englishman/Machias Bay	S	S	S,M	S
Narraguagus Bay	S	S	S,M	S
Blue Hill Bay	S	S	S,M	S
Penobscot Bay	S	S	S,M	S
Muscongus Bay	S	S	S,M	S
Damariscotta River	S	S	S,M	S

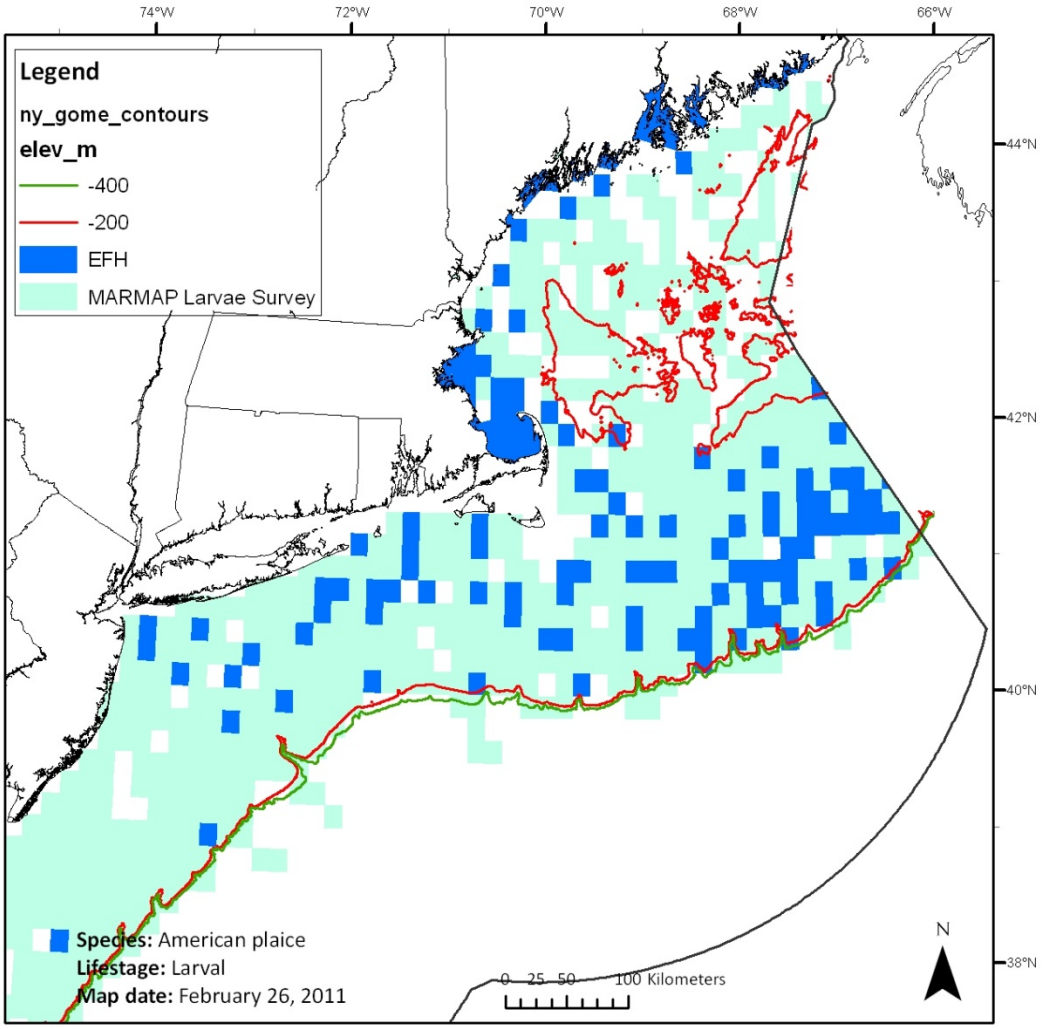
Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Sheepscot River	S	S	S,M	S
Kennebec / Androscoggin	S	S	S,M	S
Casco Bay	S	S	S,M	S
Saco Bay	S	S	S	S
Massachusetts Bay	S	S	S	S
Boston Harbor	S	S	S	S
Cape Cod Bay	S	S	S	S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

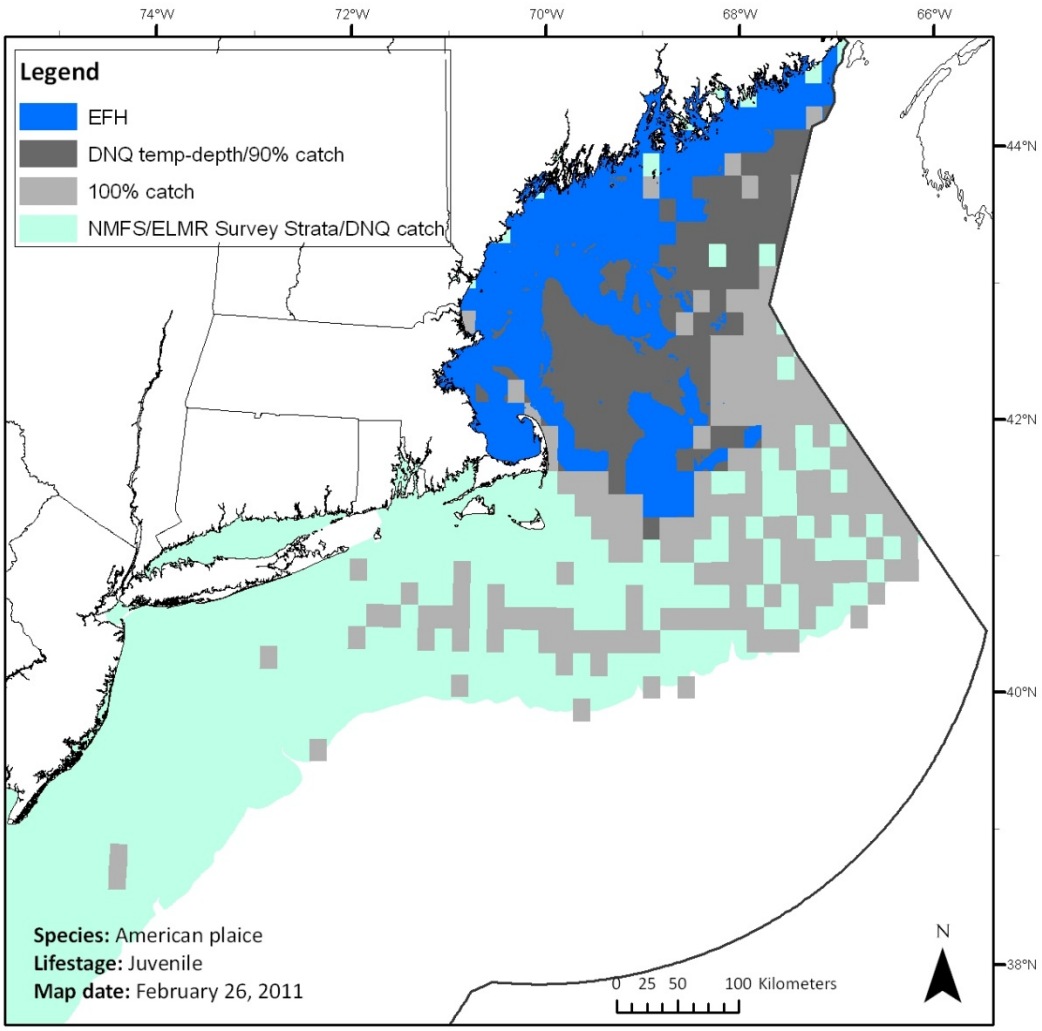
Map 13 – American plaice egg EFH.



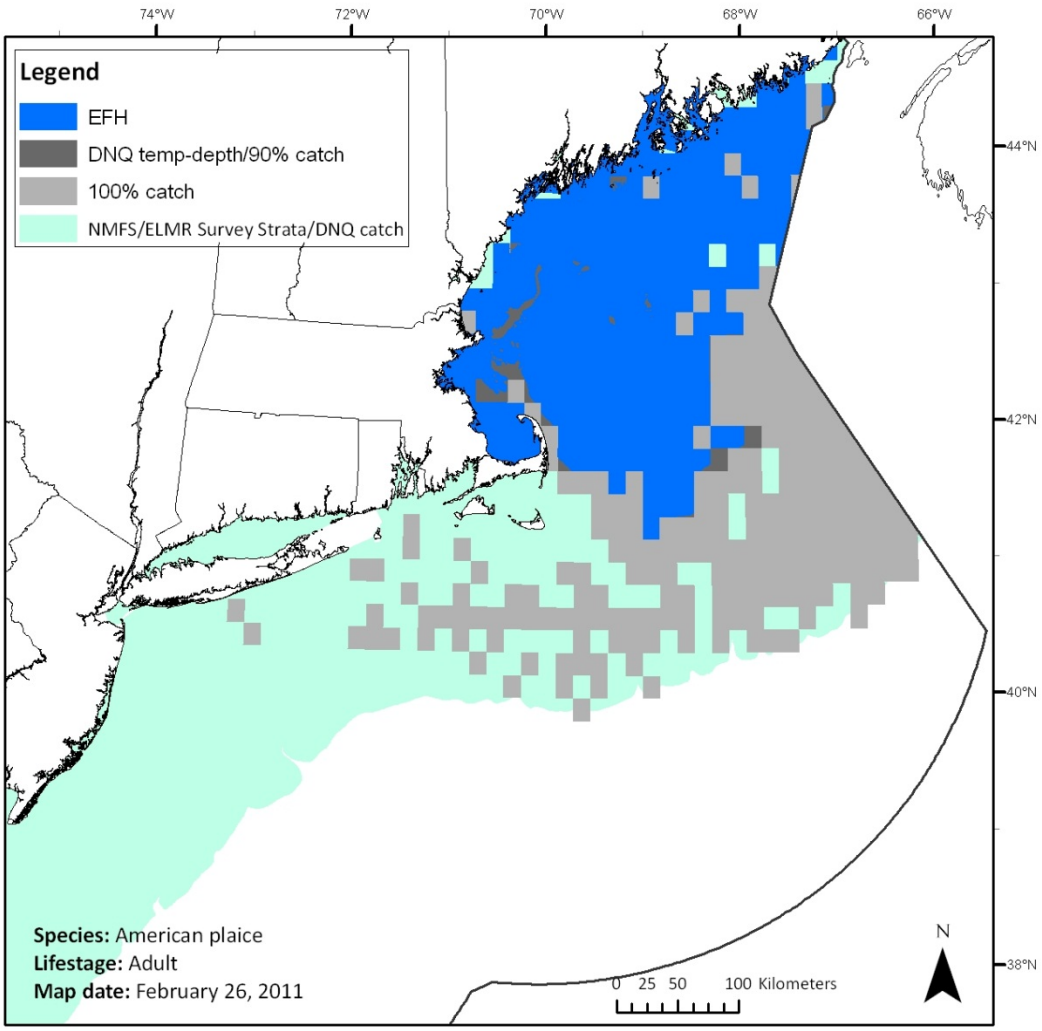
Map 14 – American plaice larval EFH.



Map 15 – American plaice juvenile EFH.



Map 16 – American plaice adult EFH.



1.2.2 Atlantic halibut

The proposed EFH designation map for all four life history stages of Atlantic halibut within the NMFS trawl survey area was developed using a GIS depiction of preferred depth and bottom temperature ranges that were determined from graphical 1963-2003 spring and fall NMFS trawl survey for juveniles or adults in NEFSC (2004a). It is also based on average catch per tow data at the 90th percentile of catch level for juveniles or adults in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys, and includes a portion of the continental slope. The proposed designation map is bounded by the historic range of the species, which was determined to approximate the area east of 70˚W longitude, i.e., the Gulf of Maine and Georges Bank.

The status quo EFH map for Atlantic halibut is very non-specific, covering the entire historic range of the species in the Gulf of Maine and on Georges Bank. The proposed new map extends over the same geographic area, but defines two very specific depth ranges, 60-140 m on the shelf and 400-700 m on the slope. The map that was approved for the DEIS erroneously included a large area on the continental shelf west of 70˚W longitude, the entire continental slope down to 700 meters, and a few scattered ten minute squares in the Gulf of Maine and in Georges Bank that are deeper than 140 meters. These errors have been corrected.

For juvenile halibut, the status quo text describes EFH as generally occurring in a very shallow depth range (20-60 m) which is not included at all in the proposed new EFH designation for the continental shelf.[27] The depth range for the adults in the status quo designation (100-700 m) is more consistent with the new depth range for both life stages, which has separate shelf and slope components (60-140 and 400-700 m). The substrates identified in the status quo and the proposed text descriptions are the same. .

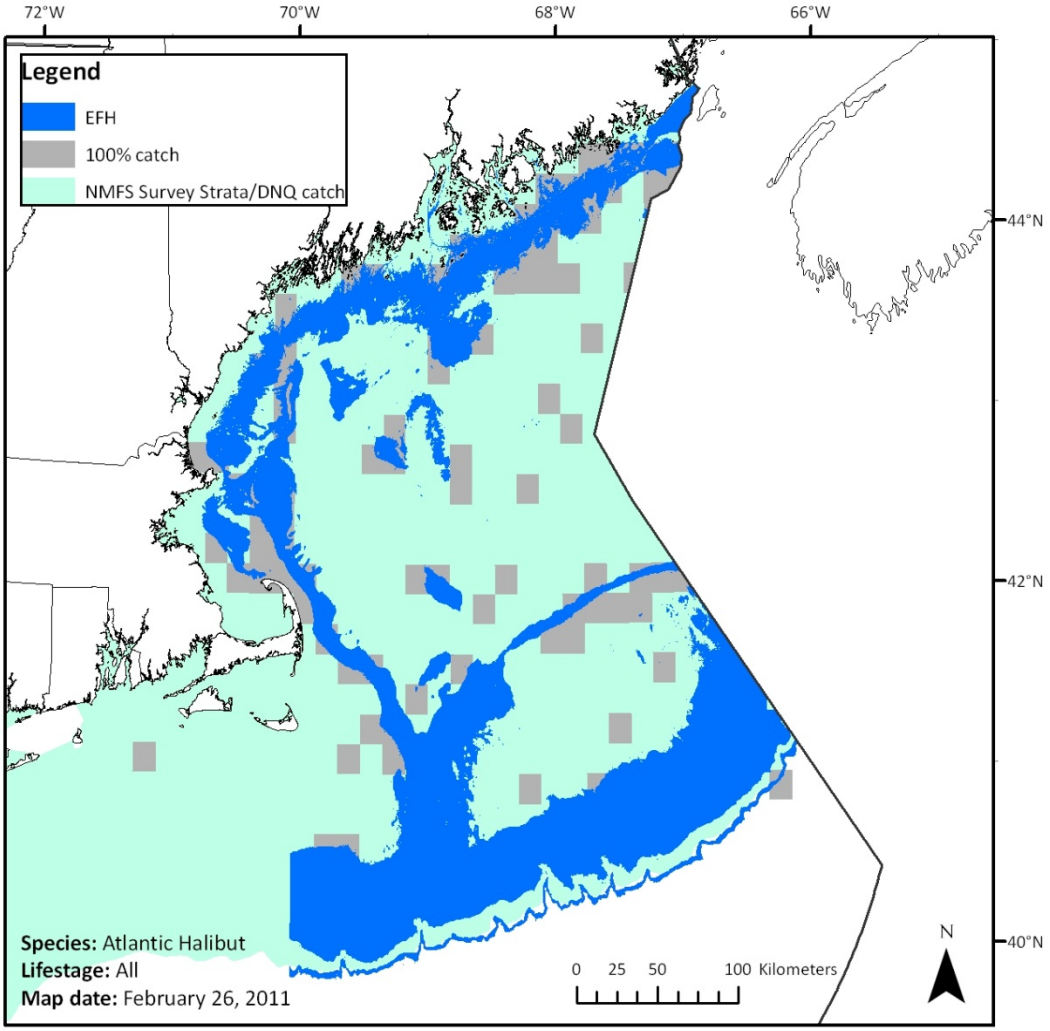
Text descriptions:
Essential fish habitat for Atlantic halibut (*Hippoglossus hippoglossus*) is designated anywhere within the geographic areas that are shown on Map 17 which exhibit the environmental conditions defined in the text descriptions. Additional habitat-related information for this species can be found in Appendix B.

Eggs and Larvae: Pelagic habitats in the Gulf of Maine, on Georges Bank, and on the continental slope south of Georges Bank, as shown on Map 17.

Juveniles and Adults: Benthic habitats in the Gulf of Maine and on Georges Bank in depths of 60 – 140 meters and on the continental slope south of Georges Bank between 400 and 700 meters on sand, gravel, and/or clay substrates, as shown on Map 17. Spawning generally occurs over rough or rocky bottom on offshore banks and on the continental slope.

[27] The 20-60 meter depth range is where juvenile halibut are most common in Canada (see Appendix B). For the proposed designations, the 60-140 m depth range was based on an analysis of the U.S. trawl survey data for juveniles and adults. The two life stages were combined because very few halibut are caught in the NMFS survey (see Table A-7).

Map 17 – Atlantic halibut EFH, all life stages.



1.2.3 Windowpane flounder

The proposed EFH designation maps for windowpane flounder eggs and larvae differ slightly from the status quo maps. Although no new region-wide survey data have been collected since the MARMAP egg and larval surveys were conducted in 1977-1987, any ten minute squares that were "filled in" in the original maps have been removed (see explanation of original mapping methodology in Appendix A). Like the no action/status quo EFH maps, the proposed maps are based on the 90th percentile of the observed range of the MARMAP survey data using the original data transformation (see Appendix A). These designations also include those bays and estuaries identified by the NOAA ELMR program as supporting windowpane flounder eggs or larvae at the "common" or "abundant" level.

The proposed EFH maps for juvenile and adult windowpane flounder are based on the distributions of depths and bottom temperatures that are associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. They are also based on average catch per tow data in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch level, and they include inshore areas where juvenile or adult windowpane were caught in 10% or more of the tows made in individual ten minute squares during state trawl surveys and ELMR information. Inshore survey data used in the proposed map of juvenile EFH includes SEAMAP survey data between Cape Hatteras and northern Florida.[28] These designations were 3E alternatives in the Phase 1 DEIS.[29]

The new designation for juvenile windowpane flounder would limit EFH to a maximum depth of 60 meters, not 100 meters as defined in the status quo designation. The maximum depth for adult EFH would only change from 75 to 70 meters. Under the proposed designations, EFH for the juveniles and adults would explicitly include the intertidal zone. The preferred sediment types (mud and sand) are the same in the proposed and status quo EFH descriptions for both life stages.

The proposed and the status quo EFH maps for the juveniles and adults include coastal areas throughout the entire Northeast region, plus the shallower portion of Georges Bank. The addition of trawl survey data from the Gulf of Maine caused more ten minute squares along the Maine coast to be designated, especially for juveniles. The primary difference between the status quo and the proposed designations is the addition of coastal waters south of Cape Hatteras to the juvenile EFH map. The approved 3D alternative for juveniles in the DEIS did not include the SEAMAP survey data. Modification of the approved maps for juvenile and adult windowpane flounder resulted in the removal of a few isolated ten minute squares on the outer continental shelf that met the 90th percentile catch criterion, but were deeper than the defined maximum depths of 60 and 70 meters.

Text descriptions:
Essential fish habitat for windowpane flounder (*Scophthalmus aquosus*) is designated anywhere within the geographic areas that are shown on the following maps and listed

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[28] SEAMAP is an acronym for the Southeast Area Monitoring and Assessment Program. This trawl survey of coastal waters between Cape Hatteras, North Carolina, and Cape Canaveral, Florida, began in 1986 and is conducted by the South Carolina Department of Natural Resources. According to SCDNR staff, the great majority of windowpane flounder caught in this survey are juveniles (no length data are collected).

[29] The preferred alternatives in the DEIS were called 3E alternatives because a few unsurveyed ten minute squares were added to the 3D maps.

in Table 5 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs and Larvae: Pelagic habitats on the continental shelf from Georges Bank to Cape Hatteras and in mixed and high salinity zones of coastal bays and estuaries throughout the region (see Map 18, Map 19, and Table 5).

Juveniles: Intertidal and sub-tidal benthic habitats in estuarine, coastal marine, and continental shelf waters from the Gulf of Maine to northern Florida, as shown on Map 20, including mixed and high salinity zones in the bays and estuaries listed inTable 5. EFH for juvenile windowpane flounder extends from the shoreline (MHW) to a maximum depth 60 meters on mud and sand substrates.

Adults: Intertidal and sub-tidal benthic habitats in estuarine, coastal marine, and continental shelf waters from the Gulf of Maine to Cape Hatteras, as shown on Map 21, including mixed and high salinity zones in the bays and estuaries listed in Table 5. EFH for adult windowpane flounder extends from the shoreline (MHW) to a maximum depth 70 meters on mud and sand substrates.

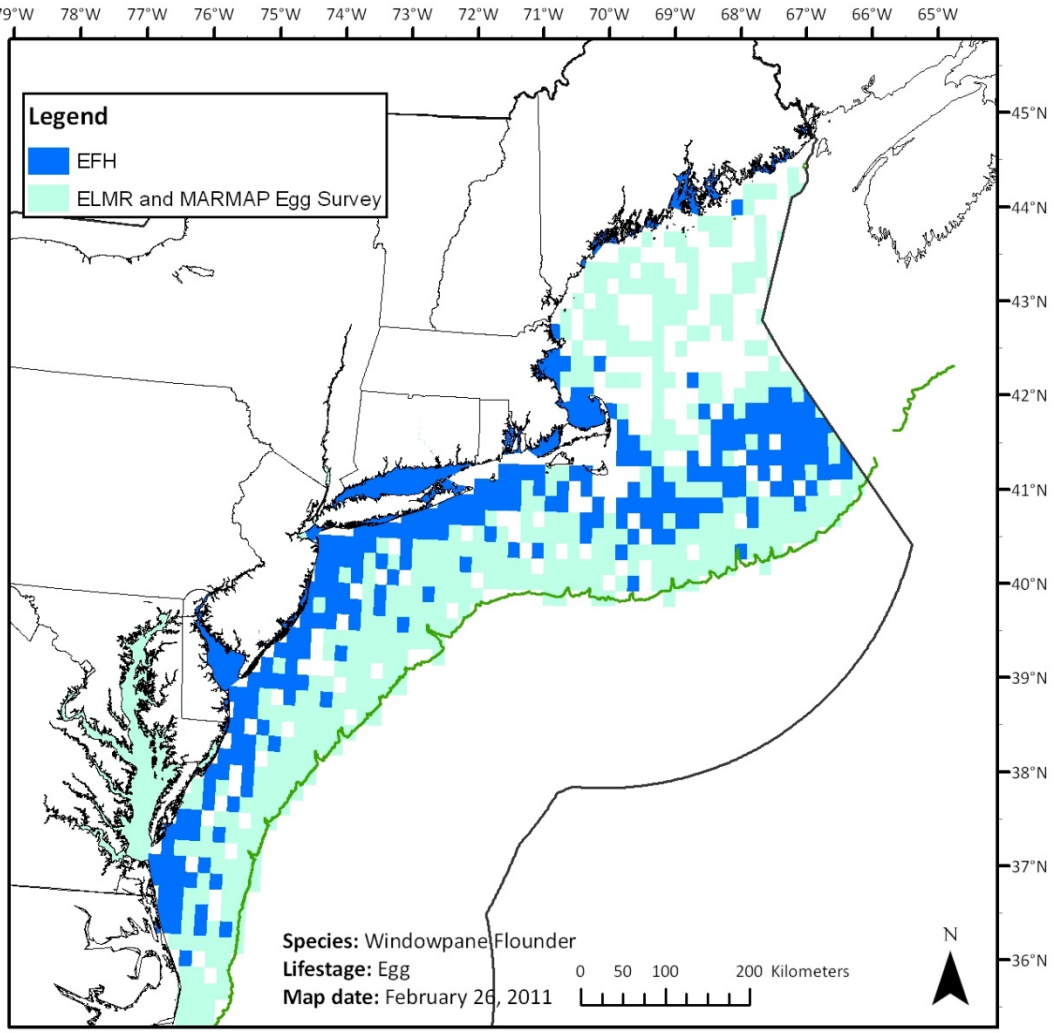
Table 5 – Windowpane flounder EFH designation for estuaries and embayments

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay	S,M	S,M	S,M	S,M
Englishman/Machias Bay	S,M	S,M	S,M	S,M
Narraguagus Bay	S,M	S,M	S,M	S,M
Blue Hill Bay	S,M	S,M	S,M	S,M
Penobscot Bay	S,M	S,M	S,M	S,M
Muscongus Bay	S,M	S,M	S,M	S,M
Damariscotta River	S,M	S,M	S,M	S,M
Sheepscot River	S,M	S,M	S,M	S,M
Kennebec / Androscoggin	S,M	S,M	S,M	S,M
Casco Bay	S,M	S,M	S,M	S,M
Saco Bay	S,M	S,M	S,M	S,M
Wells Harbor	S,M	S,M	S,M	S,M
Great Bay	S	S	S	S
Hampton Harbor*	S,M	S,M	S,M	S,M
Plum Island Sound*	S,M	S,M	S,M	S,M
Massachusetts Bay	S	S	S	S
Boston Harbor	S,M	S,M	S,M	S,M
Cape Cod Bay	S	S	S	S

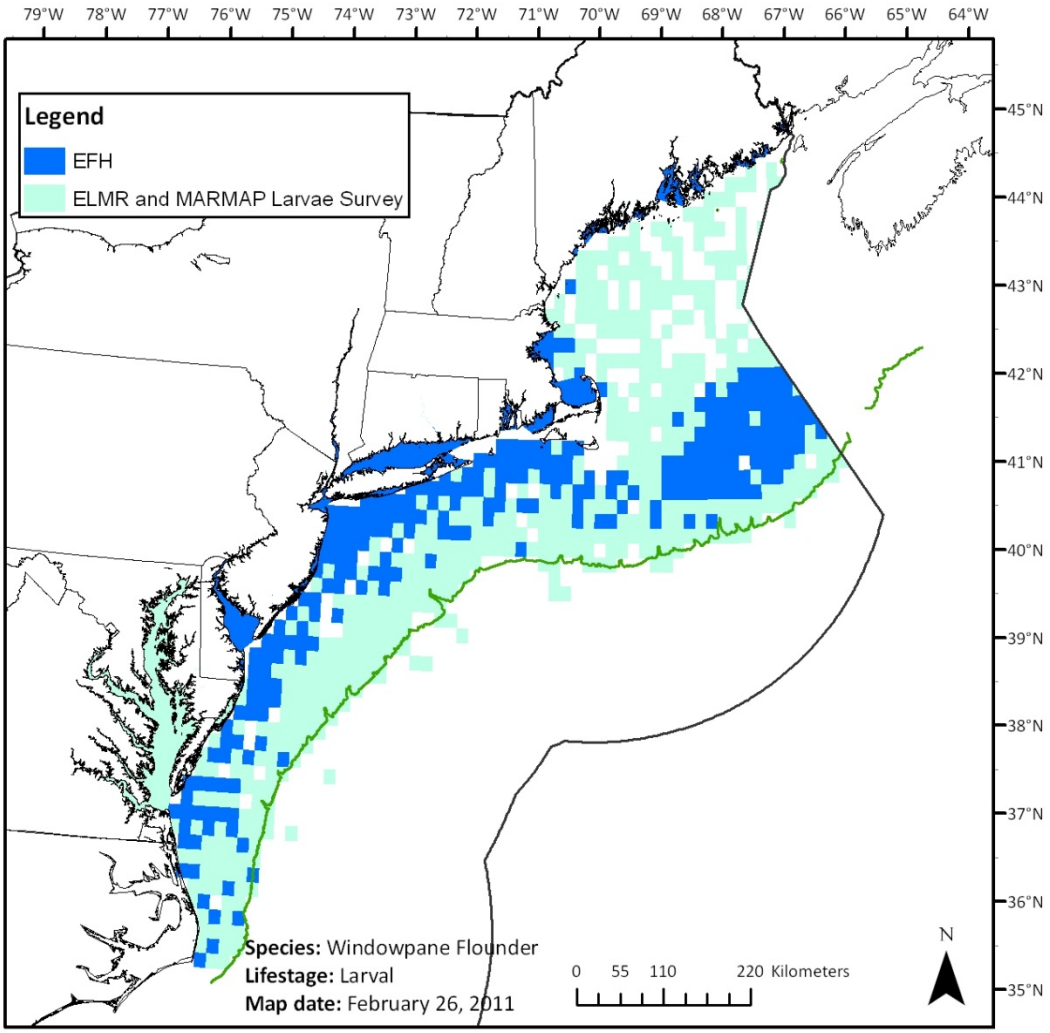
Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Waquoit Bay	S,M	S,M	S,M	S,M
Buzzards Bay	S,M	S,M	S,M	S,M
Narragansett Bay	S,M	S,M	S,M	S,M
Long Island Sound	S,M	S,M	S,M	S,M
Connecticut River	M	M	M	M
Gardiners Bay	S,M	S,M	S,M	S,M
Great South Bay	S,M	S,M	S,M	S,M
Hudson River / Raritan Bay	S	S,M	S,M	S,M
Barnegat Bay	S,M	S,M	S,M	S,M
New Jersey Inland Bays	S,M	S,M	S,M	S,M
Delaware Bay	S,M	S,M	S,M	S,M
Delaware Inland Bays*	S,M	S,M	S,M	S,M
Maryland Inland Bays*	S,M	S,M	S,M	S,M
Chincoteague Bay			S	S
Chesapeake Bay			S,M	S,M
Tangier/Pocomoke Sound			M	M

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

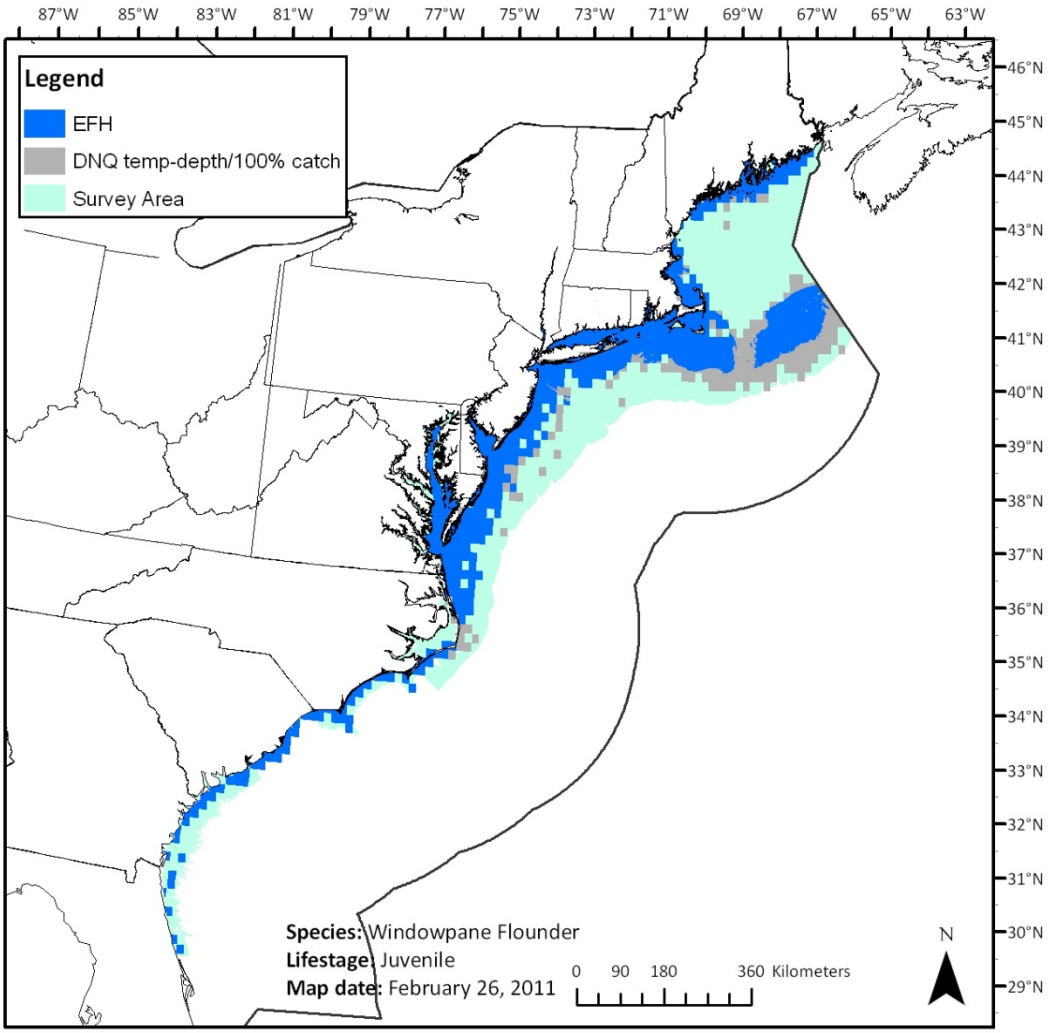
Map 18 – Windowpane flounder egg EFH.



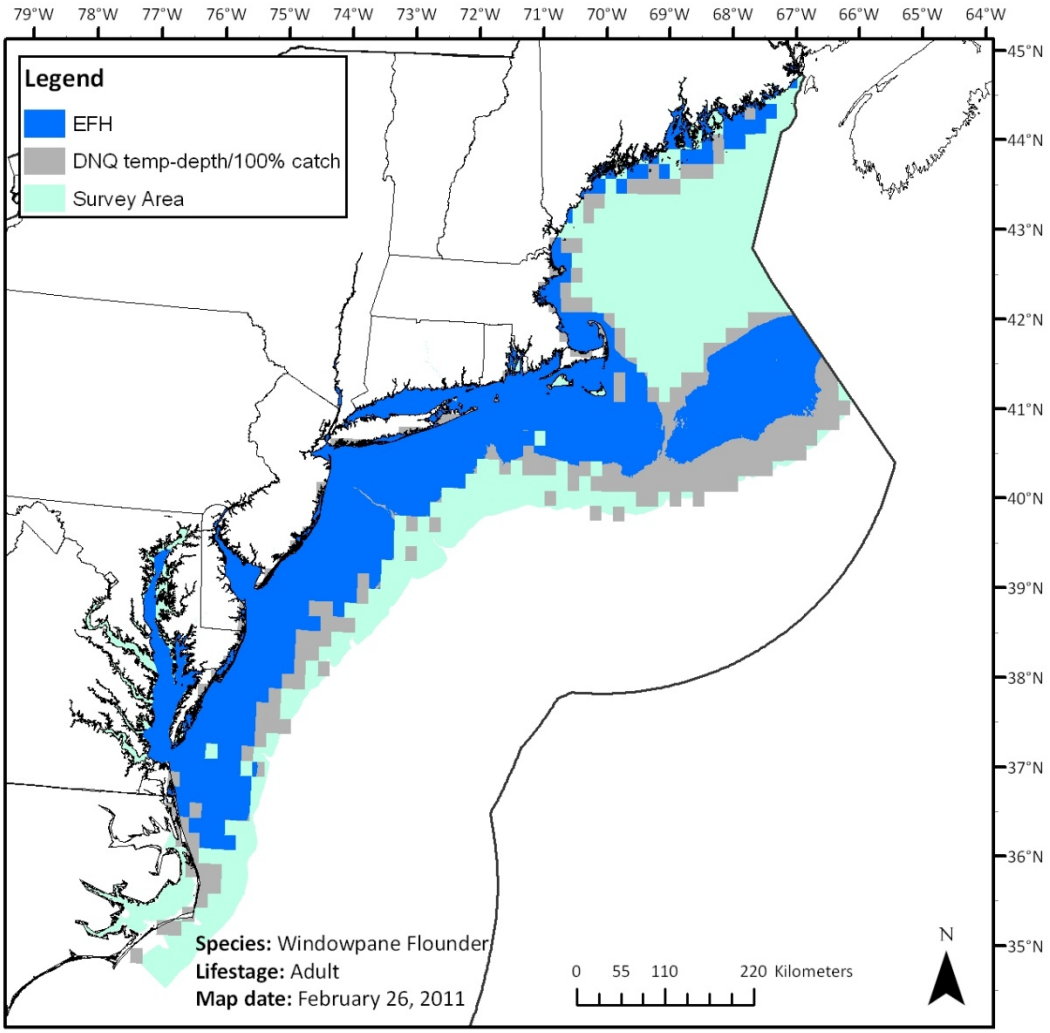
Map 19 – Windowpane flounder larval EFH.



Map 20 – Windowpane flounder juvenile EFH.



Map 21 – Windowpane flounder adult EFH.



1.2.4 Winter flounder

The proposed designation for winter flounder eggs defines EFH south of Cape Cod to be sub-tidal coastal waters from the shoreline to a maximum depth of 5 meters (relative to MLW) from Cape Cod to Delaware Bay, and from the shoreline to a maximum depth of 70 meters in the Gulf of Maine and on Georges Bank.[30] The proposed designation would also include the bays and estuaries identified in the NOAA ELMR program where winter flounder eggs or larvae are "common" or "abundant." As proposed, EFH for

[30] This is the same maximum depth defined in the status quo designation for eggs. It was based on survey information from Long Island Sound (see EFH Source Document) that was available at the time. Additional

winter flounder larvae would be pelagic habitats in the same coastal and continental shelf waters that would be designated for the adults (see adults).

The maximum depth in southern New England and the Mid-Atlantic is the same as in the status quo designation for the entire coast. It was not changed because data collected during a series of benthic winter flounder egg surveys by the U.S. Army Corps of Engineers in the New York Harbor area in recent years indicate that many more eggs are deposited on the bottom in shallow water areas, not in the deeper shipping channels. Based on this information, the Council concluded that the shoal water areas in New York harbor were the primary habitat for winter flounder eggs. Evidence from recent research studies in the southwestern Gulf of Maine (see Appendix B) show that winter flounder spawn in deeper water as well as in coastal estuaries. Based on this information, the Council decided to extend EFH for winter flounder eggs to 70 meters – the maximum depth identified in the original Bigelow and Schroeder edition of Fishes of the Gulf of Maine for spawning winter flounder on Georges Bank – north of Cape Cod and on Georges Bank.

The proposed EFH maps for juvenile and adult winter flounder are based on the distributions of depths and bottom temperatures that were either associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. The maps are also based on average catch rates in ten minute squares of latitude and longitude for juveniles and adults in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch level, and they include inshore areas where juvenile or adult winter flounder were caught in 10% or more of the tows made in individual ten minute squares in state trawl surveys and ELMR information. Additional unsurveyed ten minute squares were filled in along the Maine, New Hampshire, and Connecticut coasts and east of Nantucket Island. These designations were identified as 3E alternatives in the Phase 1 DEIS.

The proposed EFH designation for winter flounder eggs would maintain the status quo depth range of 0-5 meters south of Cape Cod, but extend EFH into much deeper water (70 meters) north of Cape Cod while reducing the maximum depth from 90 to 70 meters on Georges Bank. It also would add submerged aquatic vegetation to the list of egg substrates.

As was true for the eggs, the proposed EFH text description for juvenile winter flounder refers to vegetated (eelgrass and macroalgae) and un-vegetated muddy and sandy benthic habitats. Habitat information specific to younger and older juveniles is included in the status quo and the proposed new designations (see Appendix B for additional habitat-related information). As proposed, EFH for juveniles would extend to a maximum depth of 60 meters (not 50) and include the intertidal zone. The maximum depth for adult EFH is 70 meters in the new text description, compared to 100 meters in the status quo designation.

Because the status quo EFH maps are all based on the distribution of adults, they are all the same. Compared to the status quo map, the proposed map for eggs is much more limited in terms of area, especially south of Cape Cod and on Nantucket Shoals.[31] The differences are less apparent for the other three life stages of winter flounder. For larvae, juveniles, and adults, the deeper portion of western Georges Bank (Great South Channel) would no longer be EFH, and a fairly extensive area on the continental shelf south of Hudson Canyon would be added to the designations.

Modification of the EFH designation for winter flounder eggs – a reduction in the maximum depth from 20 to 5 meters along the coast south of Cape Cod and an increase from 20 to 70 meters north of the cape – added a significant amount of benthic habitat in the Gulf of Maine and removed a lot in southern New England and the Mid-Atlantic.[32] The new map for winter flounder larvae is totally different from the approved map since it is now based on the distribution of adults (0-70 meters) instead of being the same as the egg map. The ten meter increase in the maximum depth of EFH for juveniles and adults caused EFH to extend farther out on the continental shelf, including Georges Bank.

Text descriptions:
Essential fish habitat for winter flounder (*Pseudopleuronectes americanus*) is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 6 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Sub-tidal estuarine and coastal benthic habitats with substrates of mud, sand, muddy sand, gravel and/or submerged aquatic vegetation, from mean low water to 5 meters from Cape Cod to Delaware Bay, and to 70 meters in the Gulf of Maine (see Map 22), and including mixed and high salinity zones in the bays and estuaries listed inTable 6. EFH for winter flounder eggs also occurs on mud, sand, muddy sand, and/or gravel substrates on Georges Bank to a maximum depth of 70 meters.

Larvae: Estuarine, coastal, and continental shelf water column habitats from the shoreline to a maximum depth of 70 meters from the Gulf of Maine to Chincoteague Bay, Maryland (including Georges Bank) as shown on Map 24, including mixed and high salinity zones in the bays and estuaries listed in Table 6.

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[31] Because it is not possible to show the 5 meter depth contour, the map actually extends to 20 meters even though EFH would be limited to 5 meters; thus, the actual geographic extent of EFH for winter flounder eggs would be less than is shown on the map.
[32] Except for the deeper part of Long Island Sound, the effect of the new depth is not adequately represented on the map because it was not possible to map the 5 meter contour, so 20 meters was mapped instead.

Juveniles: Estuarine, coastal, and continental shelf benthic habitats from the Gulf of Maine to Delaware Bay (including Georges Bank) as shown on Map 23, and in mixed and high salinity zones in the bays and estuaries listed in Table 6. EFH for juvenile winter flounder extends from the intertidal zone (MHW) to a maximum depth of 60 meters and occurs on a variety of bottom types. Young-of-the-year juveniles are found inshore on muddy and sandy sediments with and without eelgrass and macroalgae, in bottom debris, and in marsh creeks. Juvenile winter flounder also occupy pebbly-gravelly substrates.

Adults: Sub-tidal estuarine, coastal, and continental shelf benthic habitats from the shoreline to a maximum depth of 70 meters from the Gulf of Maine to Chincoteague Bay, Maryland (including Georges Bank) as shown on Map 24, including mixed and high salinity zones in the bays and estuaries listed in Table 6. EFH for adult winter flounder occurs on muddy and sandy substrates, and on hard bottom on offshore banks. In inshore spawning areas, EFH includes a variety of substrates where eggs are deposited on the bottom (see eggs).

Table 6 – Winter flounder EFH designation for estuaries and embayments.

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay	S,M	S,M	S,M	S,M
Englishman/Machias Bay	S,M	S,M	S,M	S,M
Narraguagus Bay	S,M	S,M	S,M	S,M
Blue Hill Bay	S,M	S,M	S,M	S,M
Penobscot Bay	S,M	S,M	S,M	S,M
Muscongus Bay	S,M	S,M	S,M	S,M
Damariscotta River	S,M	S,M	S,M	S,M
Sheepscot River	S,M	S,M	S,M	S,M
Kennebec / Androscoggin	S,M	S,M	S,M	S,M
Casco Bay	S,M	S,M	S,M	S,M
Saco Bay	S,M	S,M	S,M	S,M
Wells Harbor	S,M	S,M	S,M	S,M
Great Bay	S,M	S,M	S,M	S,M
Hampton Harbor*	S,M	S,M	S,M	S,M
Merrimack River	M	M	M	M
Plum Island Sound*	S,M	S,M	S,M	S,M
Massachusetts Bay	S	S	S	S
Boston Harbor	S,M	S,M	S,M	S,M
Cape Cod Bay	S	S	S	S

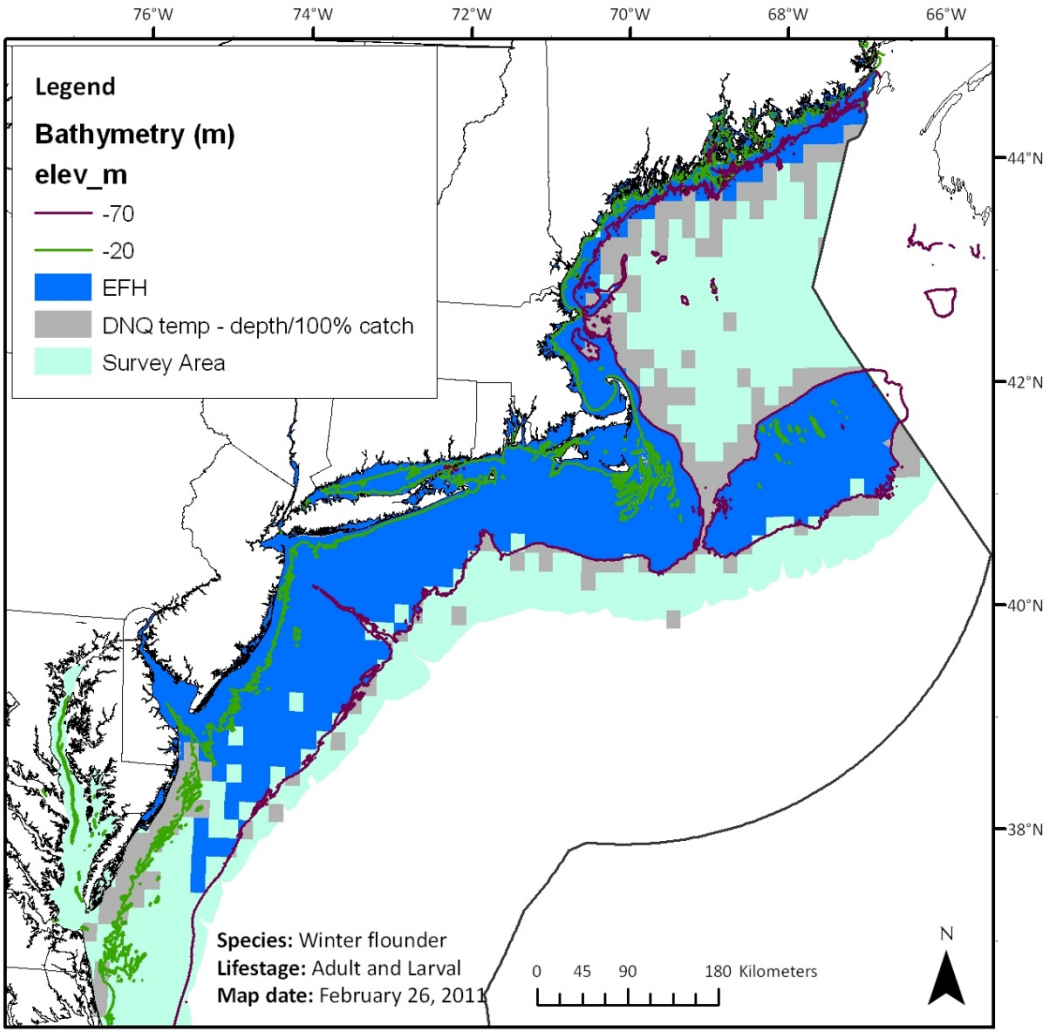
Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Waquoit Bay	S,M	S,M	S,M	S,M
Buzzards Bay	S,M	S,M	S,M	S,M
Narragansett Bay	S,M	S,M	S,M	S,M
Long Island Sound	S,M	S,M	S,M	S,M
Connecticut River	M	M	M	M
Gardiners Bay	S,M	S,M	S,M	S,M
Great South Bay	S,M	S,M	S,M	S,M
Hudson River / Raritan Bay	S,M	S,M	S,M	S,M
Barnegat Bay	S,M	S,M	S,M	S,M
New Jersey Inland Bays	S,M	S,M	S,M	S,M
Delaware Bay	S,M	S,M	S,M	S,M
Delaware Inland Bays*	S,M	S,M	S,M	S,M
Maryland Inland Bays*	S,M	S,M	S,M	S,M
Chincoteague Bay			S	S
Chesapeake Bay				

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

Map 22 – Winter flounder egg EFH.
Remove chincoteague bay

Map 23 – Winter flounder juvenile EFH.

Map 24 – Winter flounder larval and adult EFH.



1.2.5 Witch flounder

No new region-wide ichthyoplankton surveys have been conducted since the MARMAP egg and larval surveys were conducted in 1977-1987. Therefore, the proposed EFH maps for witch flounder eggs and larvae are based on the same data (100% of the ten minute squares where witch flounder eggs and larvae were collected in the MARMAP surveys) as the no action/status quo EFH maps, but any "filled in" ten minute squares were removed (see explanation of original mapping methodology in Appendix A). There is no ELMR information for any of the four life stages of witch flounder.

The proposed EFH maps for juvenile and adult witch flounder are based on the distribution of depths and bottom temperatures that were associated with high catch rates of juveniles or adults, respectively, in the 1963-2003 spring and fall NMFS trawl

surveys. The maps are also based on average catch rates for each life stage in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch level, and they include inshore areas where juvenile or adult witch flounder were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys, and a depth and geographic range on the continental slope where they were determined to be present (see Appendix A).

The status quo designations for the juveniles and adults are restricted to the Gulf of Maine and the outer continental shelf, whereas the proposed designations include the continental slope down to 1500 meters. The proposed designations define minimum depths of 80 and 100 meters for juveniles and adults, respectively, on the shelf (but not in the Gulf of Maine) whereas the status quo designations refer to minimum depths of 50 and 25 meters throughout the range of the species. As proposed, EFH for witch flounder would extend into deeper water than for any of other finfish species managed by the New England Council.[33] EFH on the slope is more continuous along the outer shelf and slope in the proposed maps than in the status quo maps, especially for the adults. For both life stages, the Gulf of Maine is a prominent feature in the status quo and in the new proposed maps. There is very little difference between the modified and the approved EFH maps for juvenile witch flounder; use of adult survey data – instead of juvenile data – to map the extent of EFH for the adults (the modified designation) "filled in" the outer Gulf of Maine almost completely, otherwise it had very little effect.

Text descriptions:
Essential fish habitat for witch flounder (*Glyptocephalus cynoglossus*) is designated anywhere within the geographic areas that are shown on the following maps and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs and Larvae: Pelagic habitats on the continental shelf throughout the Northeast region, as shown on Map 25 and Map 26.

Juveniles: Sub-tidal benthic habitats extending to a maximum depth of 400 meters in the Gulf of Maine and from 80 to 1500 meters on the outer continental shelf and slope, with mud and muddy sand substrates, as shown on Map 27.

Adults: Sub-tidal benthic habitats extending to a maximum depth of 400 meters in the Gulf of Maine and from 100 to 1500 meters on the outer continental shelf and slope, with mud and muddy sand substrates, as shown on Map 28.

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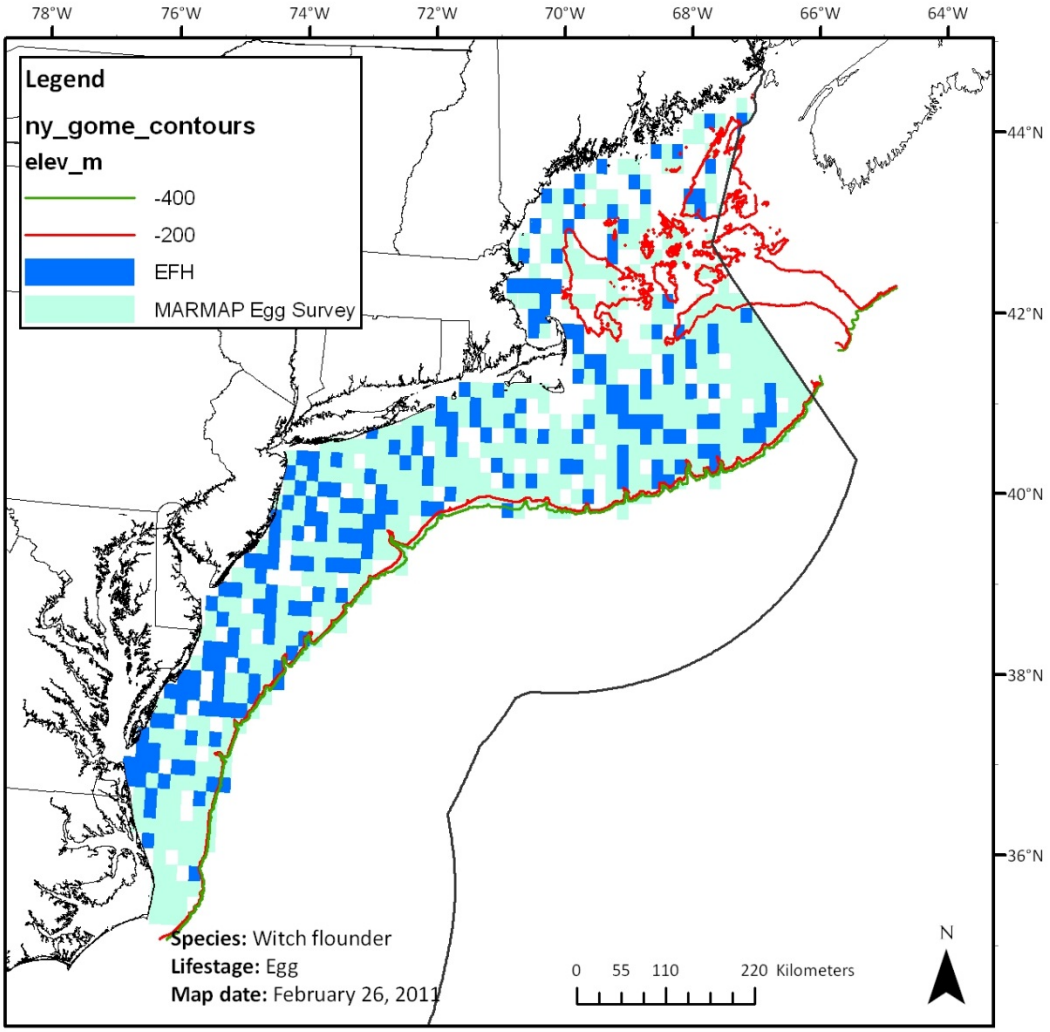
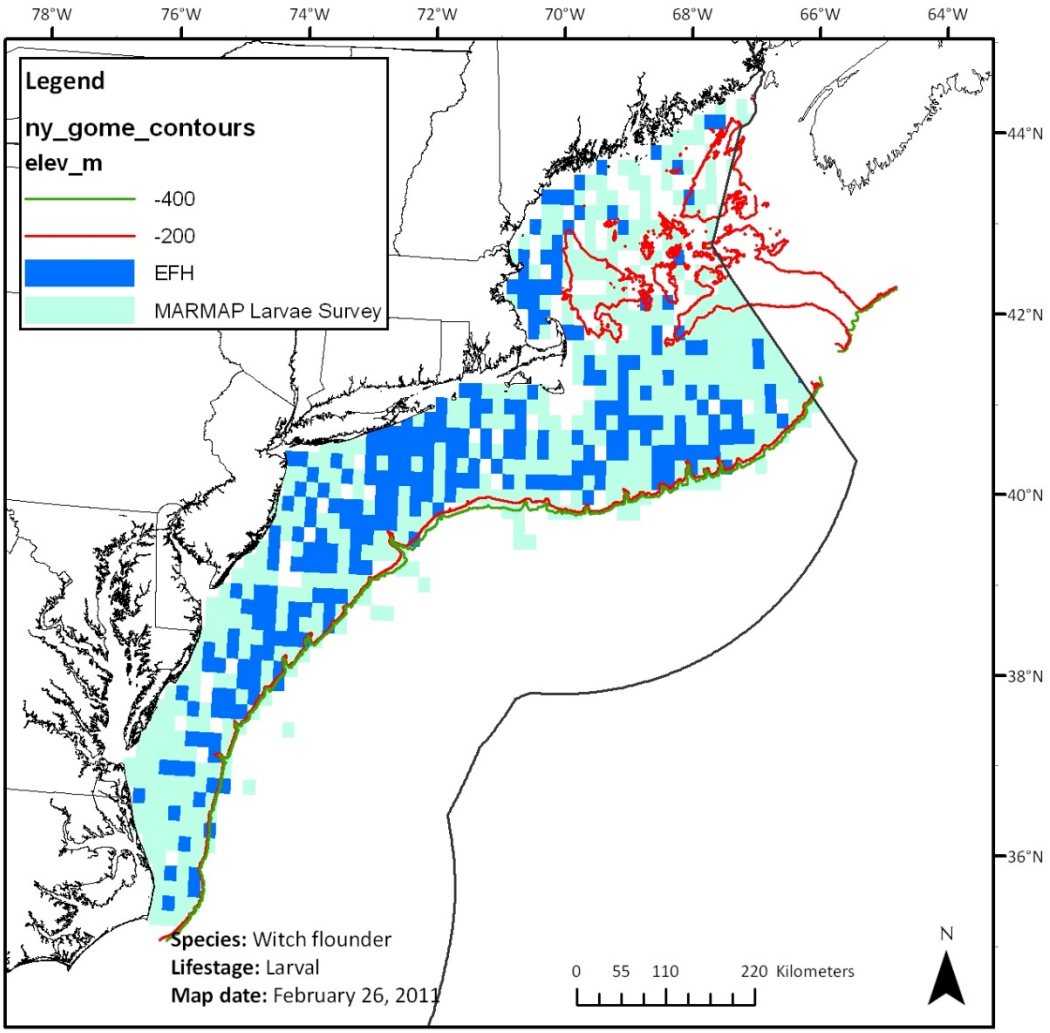
[33] Also, in the status quo adult designation, the maximum depth is 300 meters and no reference is made to the 1500 meter depth that is mentioned in the juvenile text description. The proposed maximum depth for deep-sea red crabs is 2000 meters.

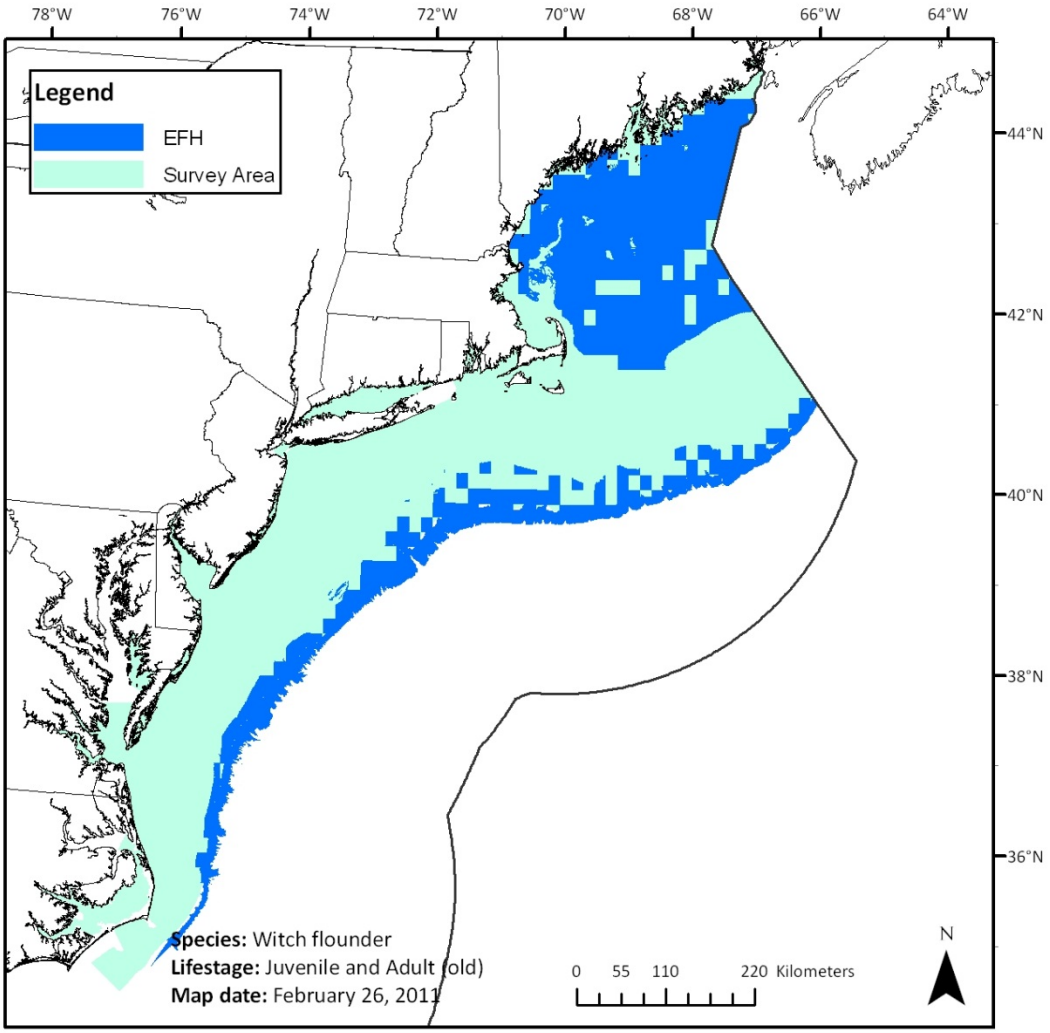
Map 25 – Witch flounder egg EFH.



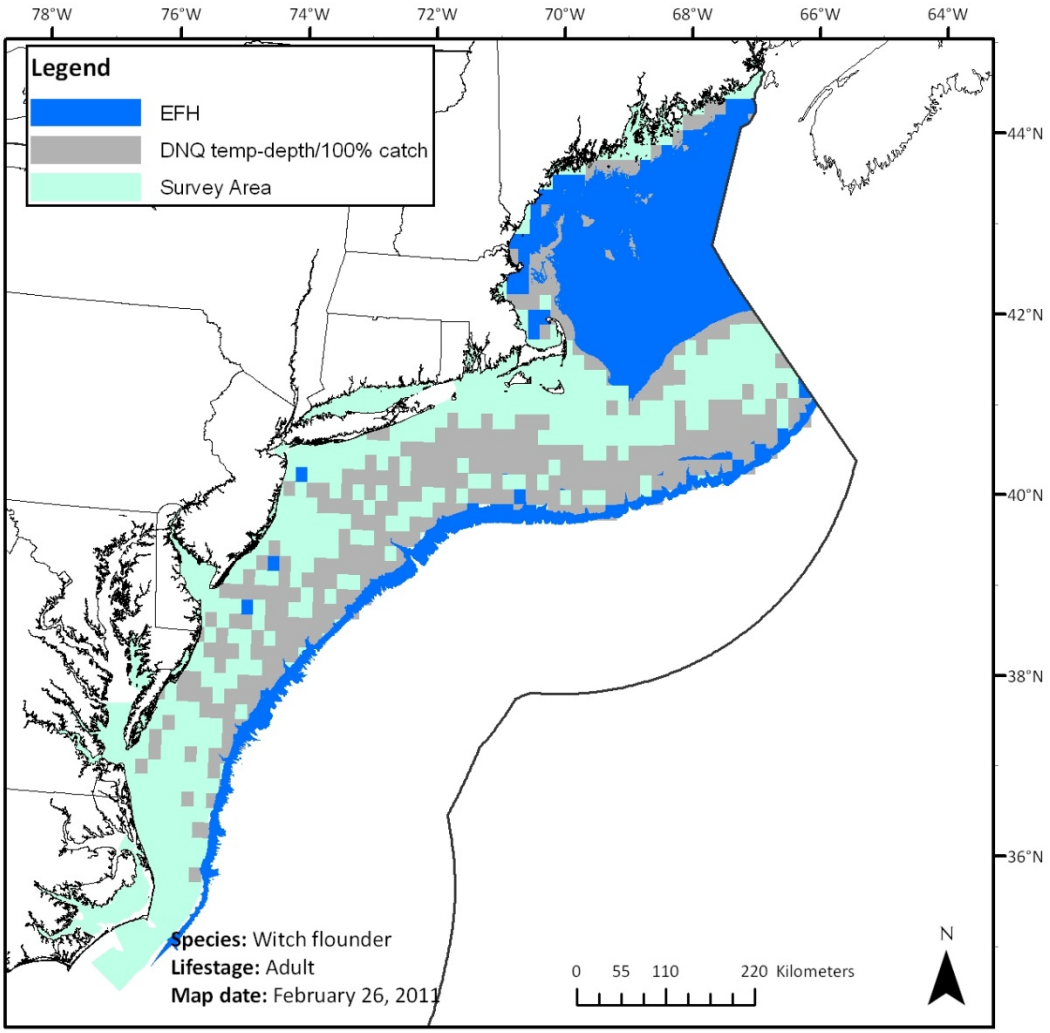
Map 26 – Witch flounder larval EFH.



Map 27 – Witch flounder juvenile EFH.



Map 28 – Witch flounder adult EFH.



1.2.6 Yellowtail flounder

No new region-wide ichthyoplankton surveys have been conducted since the MARMAP egg and larval surveys were conducted in 1977-1987. Therefore, the proposed EFH maps for yellowtail flounder eggs and larvae are based on the same data (100% of the ten minute squares where yellowtail eggs and larvae were collected in the MARMAP surveys) as the no action/status quo EFH maps, but any "filled in" ten minute squares were removed (see explanation of original mapping methodology in Appendix A). In addition, the proposed designations – like the status quo designations – include those bays and estuaries identified in the NOAA ELMR program as supporting yellowtail flounder eggs or larvae at the "rare", "common", or "abundant" level.

The proposed EFH maps for juvenile and adult yellowtail flounder are based on the distribution of depths and bottom temperatures that were associated with high catch rates of juveniles or adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. They are also based on average catch per tow data in ten minute squares of latitude and longitude for juveniles and adults in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch level and include inshore areas where juvenile or adult yellowtail flounder were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys, and ELMR information. These designations are 3D alternatives in the Phase 1 DEIS.

The status quo text descriptions for the juveniles and adults are identical and define a depth range of 20-50 meters, whereas EFH in the proposed designations would extend to 80 (juveniles) and 90 (adults) meters. The geographical extent of EFH in the proposed and the status quo maps for the juveniles and adults is very similar, although a number of ten minute squares have been added along the Maine and New Jersey coasts and south of Cape Cod. State survey data were mistakenly left out of the EFH maps that were approved in 2007: including these survey data added quite a few new ten minute squares to both maps. A re-analysis of the survey catch data as it related to depth resulted in an expansion of the depth ranges that were used to map EFH on the shelf and, therefore, increased the amount of EFH on the continental shelf.

Text descriptions:
Essential fish habitat for yellowtail flounder (*Limanda ferruginea*) is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 7 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Coastal and continental shelf pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region as far south as the upper DelMarVa peninsula, as shown on Map 29, including the high salinity zones of the bays and estuaries listed in Table 7.

Larvae: Coastal marine and continental shelf pelagic habitats in the Gulf of Maine, and from Georges Bank to Cape Hatteras, as shown on Map 30, including the high salinity zones of the bays and estuaries listed in Table 7.

Juveniles: Sub-tidal benthic habitats in coastal waters in the Gulf of Maine and on the continental shelf on Georges Bank and in the Mid-Atlantic as shown on Map 31, including the high salinity zones of the bays and estuaries listed in Table 7. EFH for juvenile yellowtail flounder occurs on sand and muddy sand from the shoreline to a maximum depth of 80 meters.

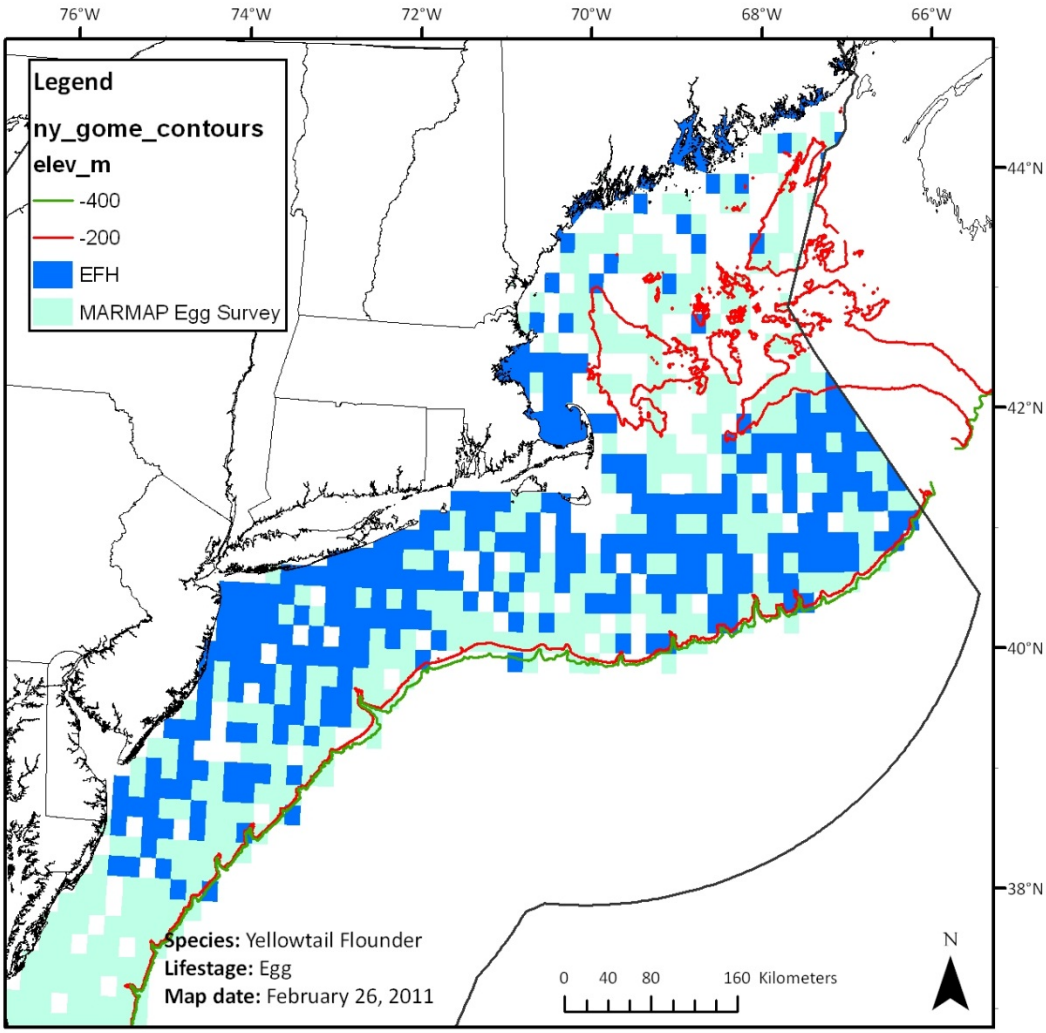
Adults: Sub-tidal benthic habitats in coastal waters in the Gulf of Maine and on the continental shelf on Georges Bank and in the Mid-Atlantic as shown on Map 32, including the high salinity zones of the bays and estuaries listed in Table 7. EFH for adult yellowtail flounder occurs on sand and muddy sand from the shoreline to a maximum depth of 90 meters.

Table 7 – Yellowtail flounder EFH designation for estuaries and embayments.

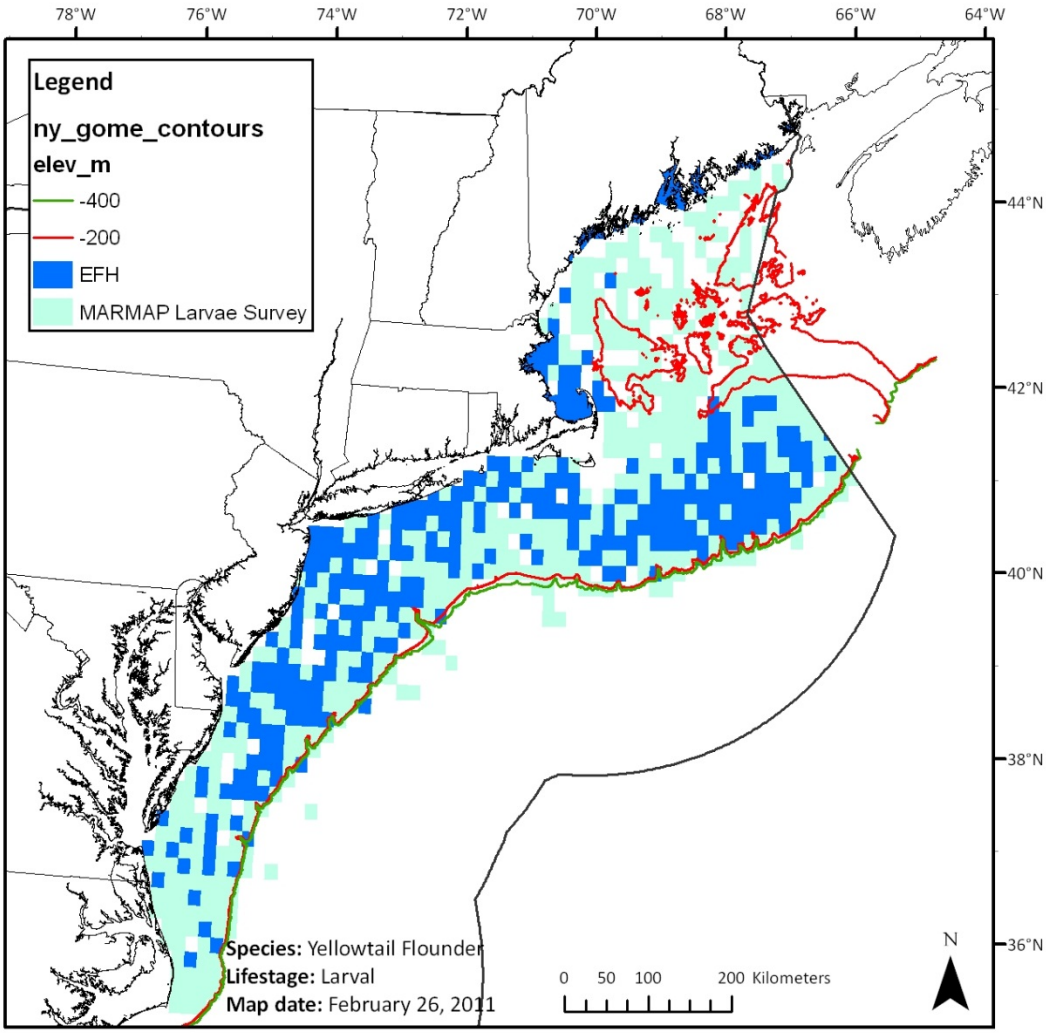
Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay	S	S		
Englishman/Machias Bay	S	S		
Narraguagus Bay	S	S		
Blue Hill Bay	S	S		
Penobscot Bay	S	S		
Muscongus Bay	S	S		
Damariscotta River	S	S		
Sheepscot River	S	S	S	S
Kennebec / Androscoggin	S	S		
Casco Bay	S	S	S	S
Saco Bay	S	S		
Wells Harbor		S		
Great Bay	S	S		
Hampton Harbor*	S	S		
Plum Island Sound*	S	S		
Massachusetts Bay	S	S	S	S
Boston Harbor	S	S	S	S
Cape Cod Bay	S	S	S	S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

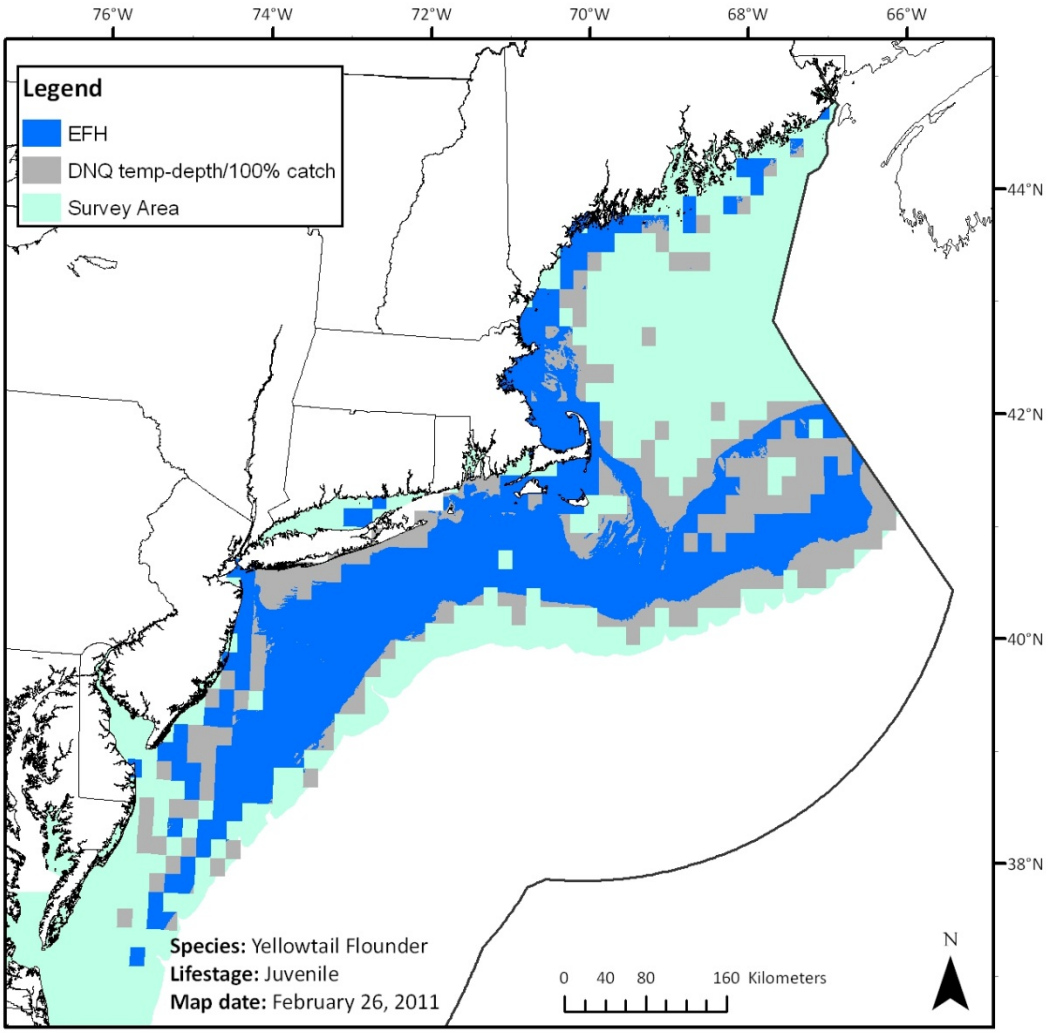
Map 29 – Yellowtail flounder egg EFH.



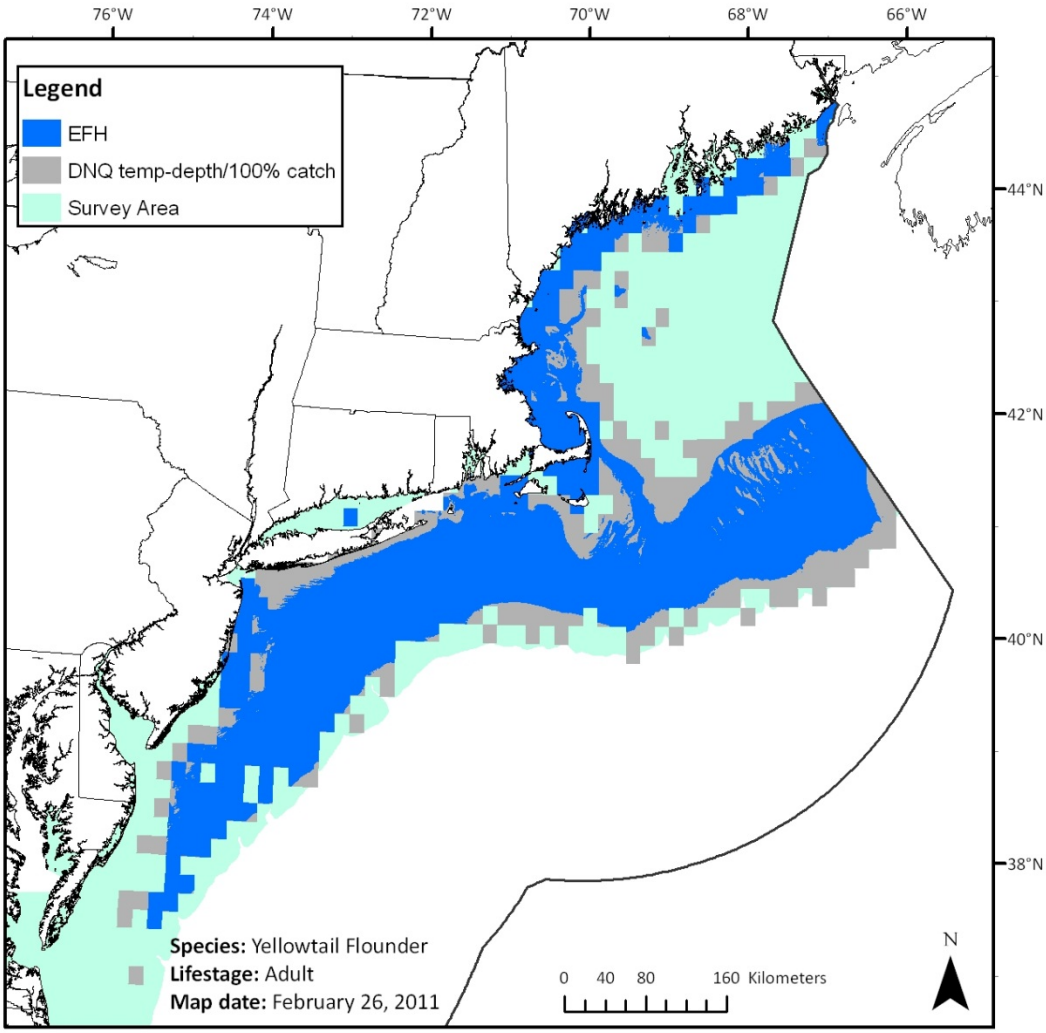
Map 30 – Yellowtail flounder larval EFH.



Map 31 – Yellowtail flounder juvenile EFH.



Map 32 – Yellowtail flounder adult EFH.



1.3 Hakes

1.3.1 Red hake

The proposed EFH map for red hake eggs, larvae, and juveniles is based on the distributions of depths and bottom temperatures that are associated with high catch rates of juveniles in the 1963-2003 spring and fall NMFS trawl surveys.[34] This

[34] Red hake eggs and larvae were not differentiated from eggs and larvae of white, spotted and longfin hake in all of the 1978-1987 MARMAP survey collections. In the original (status quo) designations, the egg and larval maps were based on egg survey data for all four species plus

designation is also based on average catch rates of juveniles in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75th percentile of catch level, includes inshore areas where juvenile red hake were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys and ELMR areas for eggs, larvae, and juveniles. This was Alternative 3C in the Phase 1 DEIS. The proposed EFH map for adults was created in the same way, except that the 1968-2005 trawl survey data were mapped at the 90th percentile and the map includes the continental slope down to 750 meters, the reported maximum depth for adult red hake in the Northeast region (Alternative 3D in the DEIS). **From Dave: The HC rejected a proposed new alternative for red hake eggs and larvae that was based only on MARMAP+ELMR data, arguing that there couldn't be juvs along the ME coast if there weren't any larvae in the GOM . They also felt the MARMAP data were too out-of-date and don't reflect recent northward shifts in distribution (same case made for silver hake). Red hake spawn primarily in SW GB and in SNE, also in GOM. Is there a problem here because the juv ELMR areas along the ME coast are in the map, and larvae are not designated in any ELMR areas north of Great Bay NH? For other species, the opposite approach was taken: only the egg and larval ELMR areas were included in the maps. This is inconsistent, but does it matter?**

Compared to the status quo EFH descriptions, the proposed juvenile text description refers to estuarine and coastal marine benthic habitats, including the intertidal zone, not just the continental shelf, and to a much wider variety of substrates for young-of-the-year and older juveniles than the status quo description. The proposed adult EFH designation defines a much broader depth range than the status quo designation and extends EFH on to the continental slope to a depth of 750 meters.

The proposed EFH map for red hake eggs, larvae, and juveniles covers roughly the same geographic area as the individual status quo maps for these three life stages, but with some added detail – notably a considerable amount of non-EFH area at intermediate depths and in deep water (>80 m) on the continental shelf, in shallow water on Georges Bank, and in the outer Gulf of Maine. The proposed EFH map for adults is very similar to the status quo map, with the exception of narrow "bands" of non-EFH area in coastal Gulf of Maine waters and on the outer continental shelf. As is true for other species, EFH would be defined more realistically in the proposed designations because of the use of level 2 depth information (60-300 meters for adults) on the shelf, rather than only relying on survey data binned into ten minute squares.

Text descriptions:

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juvenile trawl survey data and ELMR data. When the proposed new EFH maps were developed, no MARMAP data for either life stage were used.

Essential fish habitat for red hake (*Urophycis chuss*) is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 8 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs and Larvae: Pelagic habitats in the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic, as shown on Map 33, and in the bays and estuaries listed in Table 8.

Juveniles: Intertidal and sub-tidal benthic habitats throughout the region on mud and sand substrates, from the shoreline (to MHW) to a maximum depth of 80 meters, as shown on Map 33, including the bays and estuaries listed in Table 8. EFH for young-of-the-year juveniles in coastal waters includes eelgrass and macroalgae. Shelter (*e.g.*, shells, benthic epifauna, bottom depressions, and even inside live scallops) is critical for older juveniles.

Adults: Benthic habitats in the Gulf of Maine and the outer continental shelf and slope in depths of 50 – 750 meters (see Map 34) and in shallower sub-tidal waters in a number of inshore estuaries and embayments (see Table 8). EFH for adult red hake occurs on soft sediments (mud and sand) or shell beds.

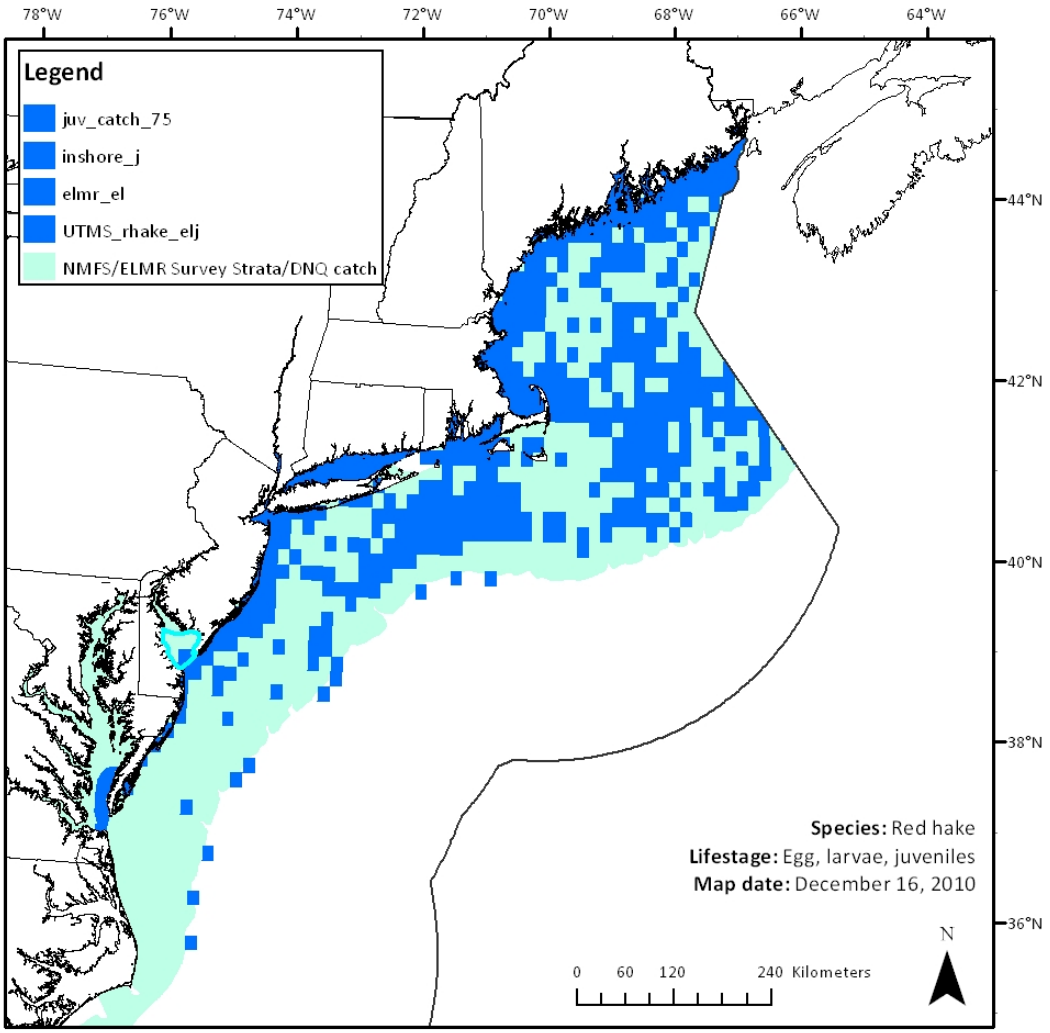
Table 8 – Red hake EFH designation for estuaries and embayments

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay			S,M	S,M
Englishman/Machias Bay			S	S
Narraguagus Bay			S	S
Blue Hill Bay			S	S
Penobscot Bay			S,M	S,M
Muscongus Bay			S,M	S,M
Damariscotta River			S,M	S
Sheepscot River			S,M	S,M
Kennebec / Androscoggin			S,M	S,M
Casco Bay			S	S
Saco Bay			S	S
Great Bay		S	S	S
Hampton Harbor*			S	S
Merrimack River		M		
Plum Island Sound*			S	S
Massachusetts Bay		S	S	S
Boston Harbor		S	S	S

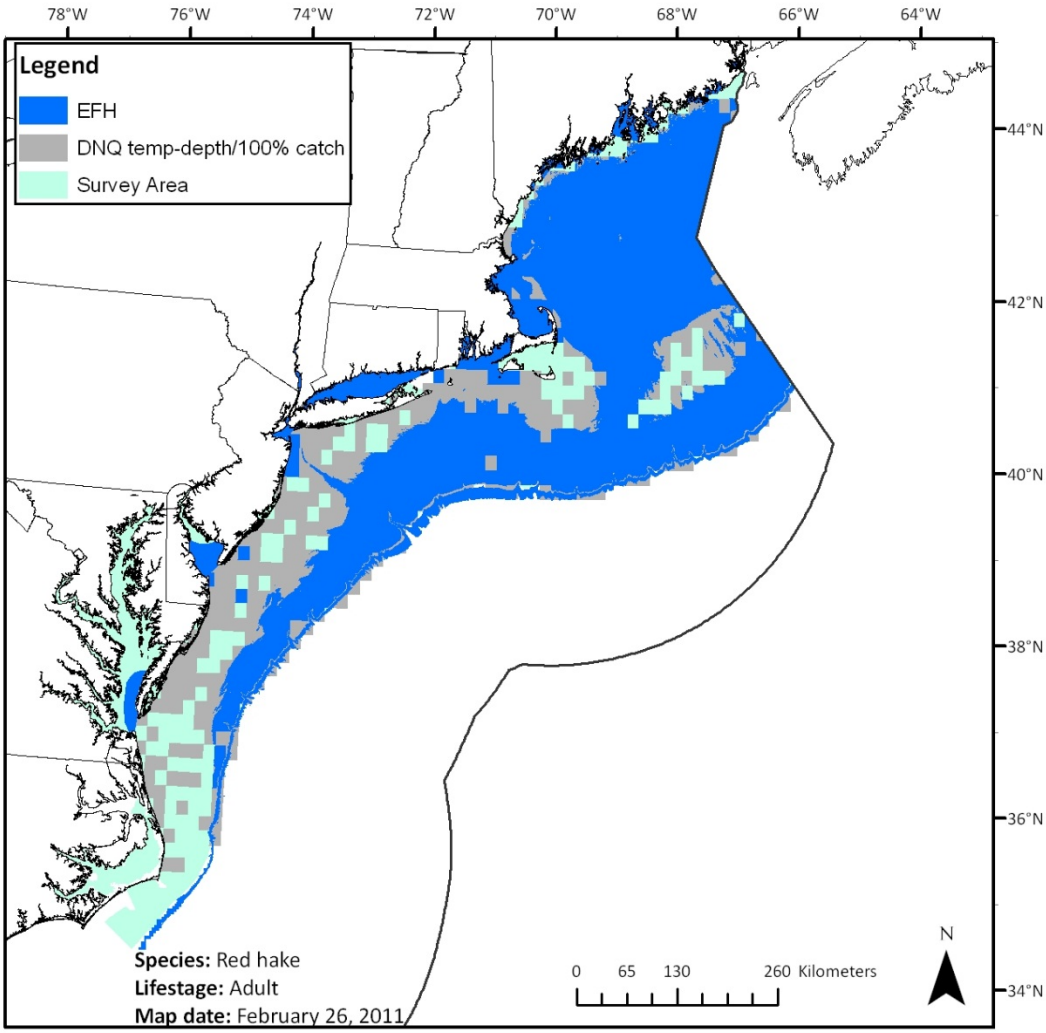
Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Cape Cod Bay		S	S	S
Buzzards Bay	S	S	S,M	S,M
Narragansett Bay	S	S	S	S
Long Island Sound			S,M	S,M
Connecticut River			M	M
Hudson River / Raritan Bay		S,M	S,M	S,M
Delaware Bay				S
Chesapeake Bay			S	S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

Map 33 – Red hake egg, larval and juvenile EFH.



Map 34 – Red hake adult EFH.



1.3.2 White hake

Because no MARMAP data were available for the eggs and larvae of this species, the juveniles and adults were used as proxies to define the geographical extent of EFH.[35] The proposed EFH map for white hake eggs is based upon average catch per tow data for adults in ten minute squares of latitude and longitude during 1968-2005 in the fall and spring NMFS trawl survey at the 90th percentile catch level. It also includes ten minute squares in inshore areas where adult white hake were caught in state trawl surveys in 10% or more of the tows made in any given square, and the bays and

[35] White hake eggs and larvae were not differentiated from eggs and larvae of red, spotted and longfin hake in the MARMAP surveys.

estuaries in the Gulf of Maine identified by the NOAA ELMR program where white hake eggs were reported to be common or abundant. This map for also defines EFH along the continental slope, based on reported maximum depth and geographic range information for the adults. The proposed EFH map for white hake larvae is also based upon the 90% NMFS average catch data, but in this case, for the juveniles. It also includes inshore survey data for juveniles and ELMR areas in the Gulf of Maine where white hake larvae were reported to be common or abundant.[36]

In 2007, the Council approved a single Alternative 2D egg and larval EFH map for white hake that was based on the distribution of juveniles at the 90th percentile level, plus inshore survey ten minute squares and ELMR areas for eggs and larvae, but not juveniles, and separate 3D alternative designations for the juveniles and adults (see Appendix). The new maps for eggs and larvae were approved by the Habitat Committee in 2011 and are 3E designation alternatives. Both the proposed 3E and 2D larval maps include the Gulf of Maine and portions of Georges Bank, but the 3E map covers more of the outer Gulf of Maine and extends EFH over a much larger portion of Georges Bank and southern New England, with a few areas in the New York Bight and along the outer shelf break. The proposed 3E map for eggs includes a continuous stretch of EFH along the outer shelf that is not in the 2D map.

The proposed EFH maps for juvenile and adult white hake are based on the distributions of depths and bottom temperatures that are associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. They are also based on average catch rates of juveniles or adults in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile catch level, include inshore areas where juvenile or adult white hake were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys, and ELMR information for the Gulf of Maine. These designations were 3D alternatives in the Phase 1 DEIS.

The proposed EFH map for juveniles includes the same geographic area as the status quo map, but includes all the nearshore waters in the Gulf of Maine and more area on the continental shelf. The proposed juvenile designation also refers specifically to the intertidal zone and extends EFH into deeper water on the shelf (300 vs 225 m). The proposed designation for adult white hake (text and map) would extend EFH on to the continental slope down to 900 m and limit EFH on the outer continental shelf to depths greater than 100 m. The proposed adult map also eliminates some areas in the inner Gulf of Maine that were included originally.

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[36] The proposed larval and juvenile maps are the same because the juvenile survey data is continuous in Gulf of Maine coastal waters, so the fact that there are ELMR areas there which are designated as EFH for juveniles and not larvae (see Table 18) is irrelevant.

As modified with a broader annual depth range and a shallower minimum depth, the proposed juvenile map extends EFH into the 30-60 and 120-140 m depth ranges in the Gulf of Maine. An error in the extent of the continental slope EFH data layer in the 3D alternative in the DEIS has been corrected, reducing the maximum depth from 2,250 to 900 meters. Also, a few partial ten minute squares on the outer shelf that met the depth and bottom temperature criteria for adult white hake have been added to the modified EFH map.

Text descriptions:
Essential fish habitat for white hake (*Urophycis tenuis*) is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 9 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Pelagic habitats in the Gulf of Maine, including Massachusetts and Cape Cod bays, and the outer continental shelf and slope (see Table 9 and Map 35).

Larvae: Pelagic habitats in the Gulf of Maine, in southern New England, and on Georges Bank, as shown in Map 36.

Juveniles: Intertidal and sub-tidal benthic habitats in the Gulf of Maine, including mixed and high salinity zones in a number of bays and estuaries north of Cape Cod (see Table 9), on Georges Bank, in southern New England, and in a few locations in the New York Bight and on the edge of the continental shelf, from the shoreline (MHW) to a maximum depth of 300 meters (see Map 37). Pelagic phase juveniles are found in the water column. EFH for benthic phase juveniles occurs on fine-grained, muddy substrates. Young-of-the-year juveniles inhabit shallow nearshore waters in the Gulf of Maine and can be found in eel grass.

Adults: Sub-tidal benthic habitats in the Gulf of Maine, including mixed and high salinity zones in a number of bays and estuaries north of Cape Cod (see Table 9), and between 100 and 900 meters on the outer continental shelf and slope (see Map 38). EFH for adult white hake occurs on fine-grained, muddy substrates. Spawning takes place in deep water on the continental slope.

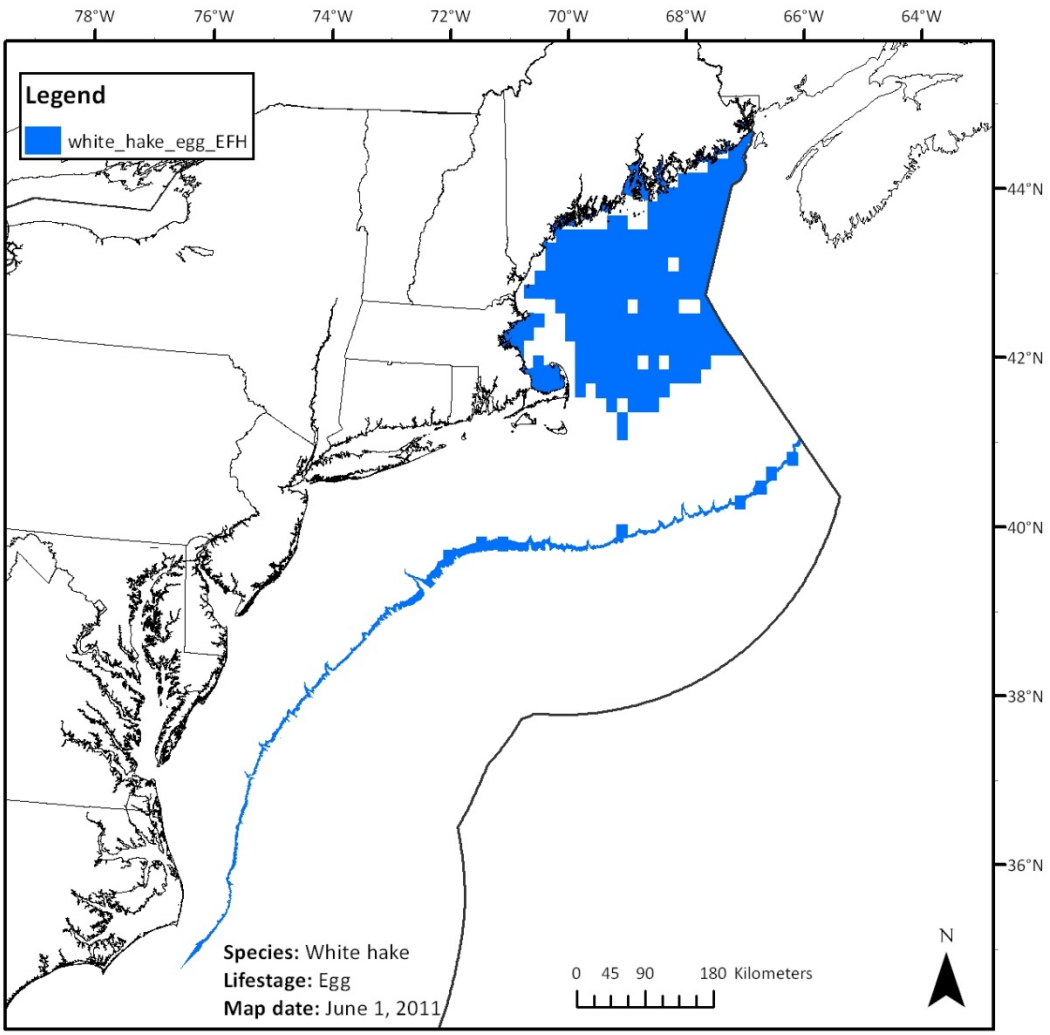
Table 9 – White hake EFH designation for estuaries and embayments.

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay			S,M	S,M
Englishman/Machias Bay			S,M	S
Narraguagus Bay			S,M	S
Blue Hill Bay			S,M	S

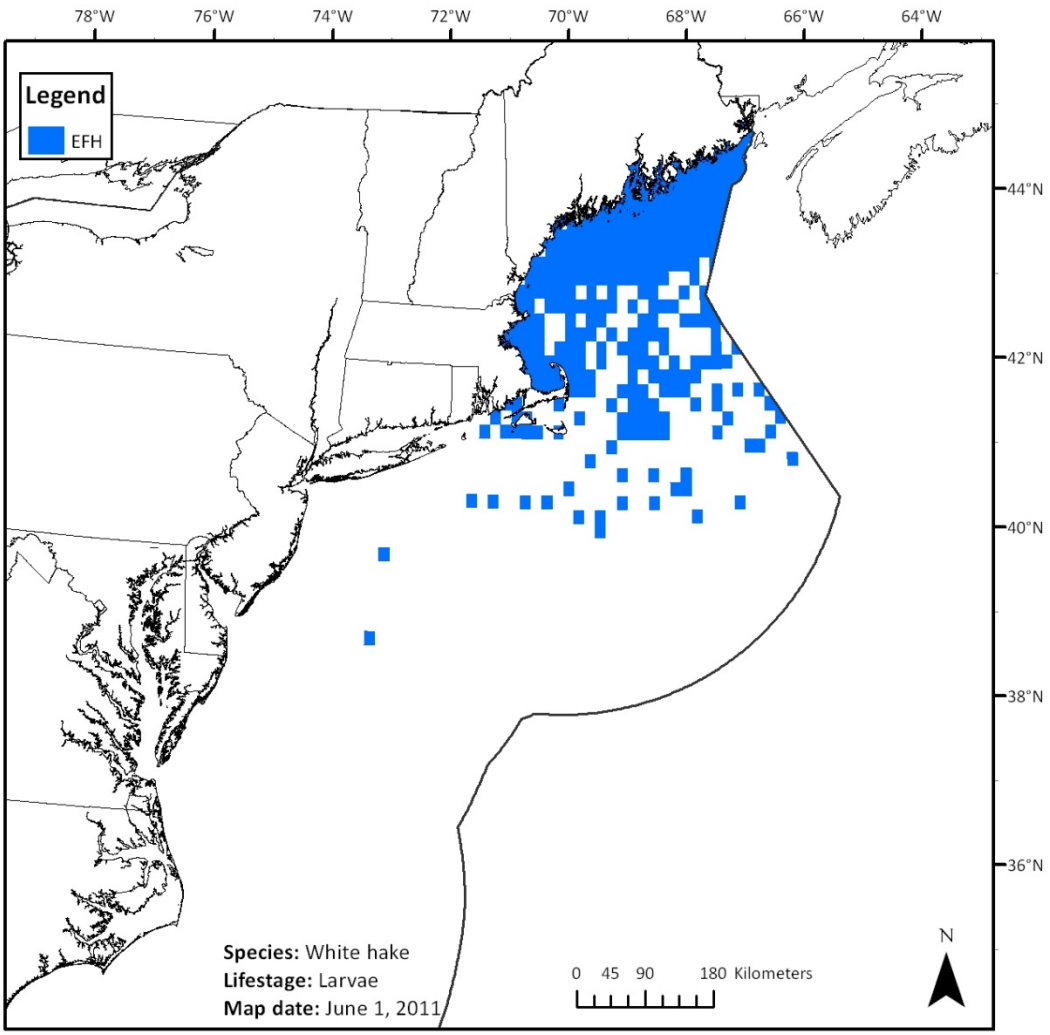
Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Penobscot Bay			S,M	S
Muscongus Bay			S,M	S,M
Damariscotta River			S,M	S,M
Sheepscot River			S,M	S,M
Kennebec / Androscoggin			S,M	S,M
Casco Bay			S,M	S,M
Saco Bay			S,M	S,M
Wells Harbor			S,M	S,M
Great Bay	S		S	S
Hampton Harbor*	S,M		S,M	S,M
Merrimack River	M			
Plum Island Sound*	S,M		S,M	S,M
Massachusetts Bay	S	S	S	S
Boston Harbor	S	S	S	S
Cape Cod Bay	S	S	S	S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

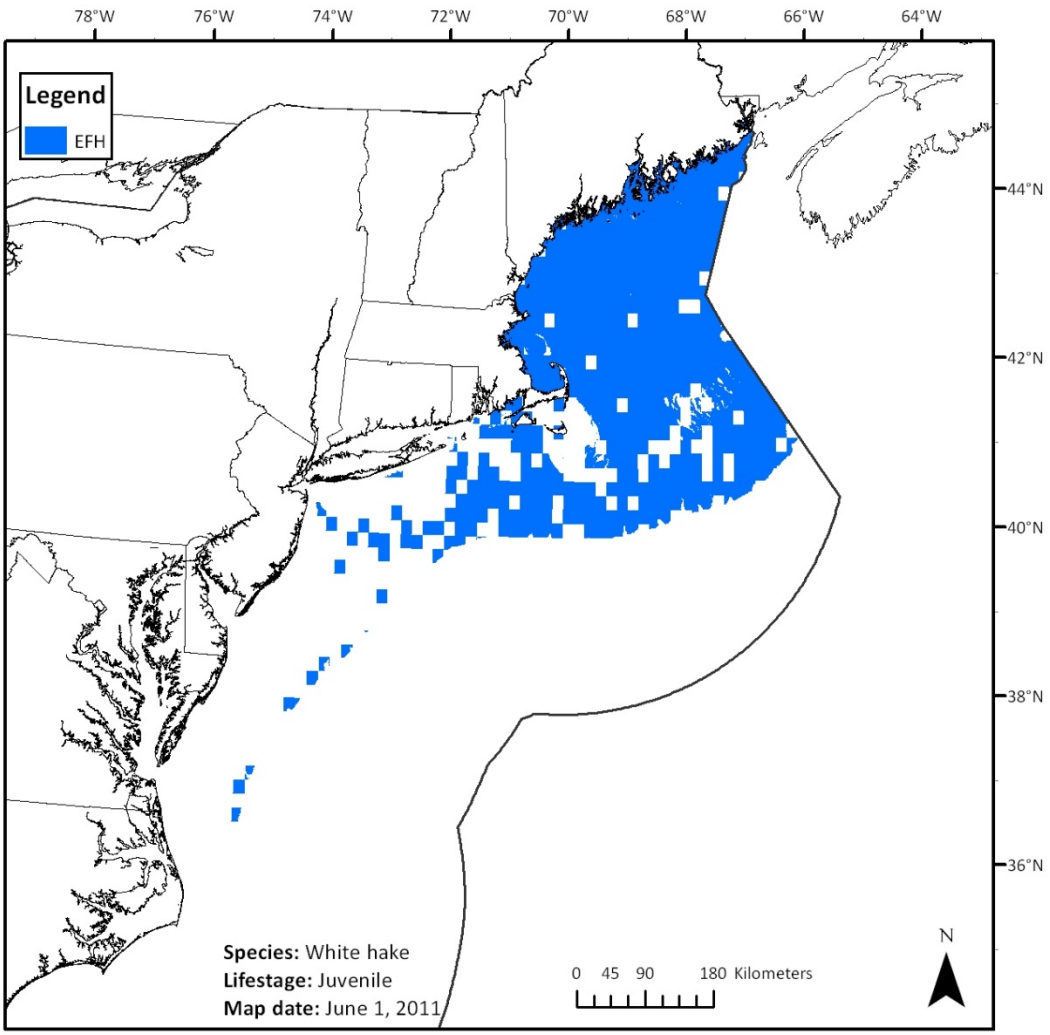
Map 35 – White hake egg EFH.



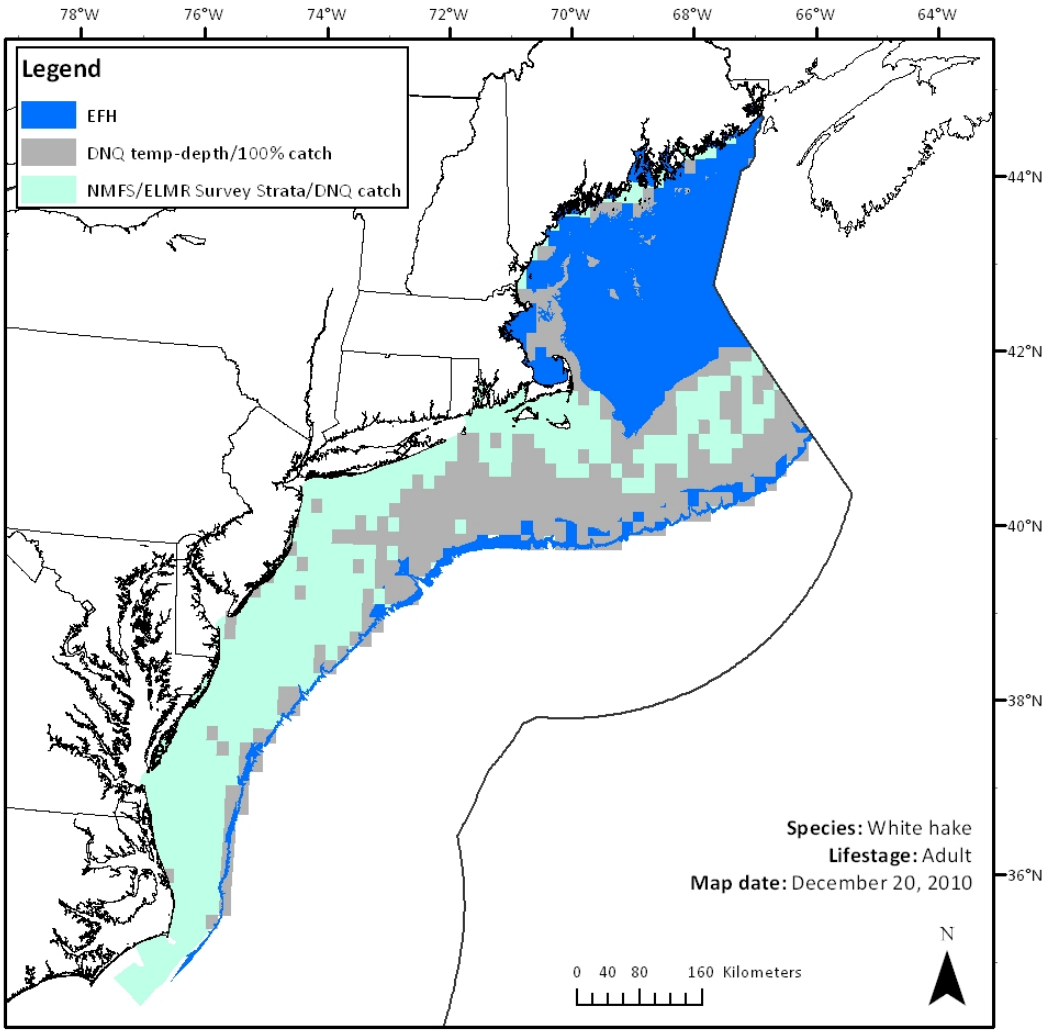
Map 36 – White hake larval EFH.



Map 37 – White hake juvenile EFH.



Map 38 – White hake adult EFH.



1.3.3 Silver hake

The proposed EFH map for silver hake eggs and larvae is based upon the average catch per tow of juvenile silver hake in ten minute squares of latitude and longitude during 1968-2005 in the fall and spring NMFS trawl surveys at the 90th percentile of catch level. This alternative also includes ten minute squares in inshore areas where juvenile silver hake were caught in state trawl surveys in 10% or more of the tows made in each square, and bays and estuaries identified by the NOAA ELMR program where silver hake eggs and larvae were "common" or "abundant." This designation was referred to as Alternative 2D in the Phase 1 DEIS. The proposed egg and larval map, like the status quo map, includes nearly all the Gulf of Maine, but it covers less area on Georges Bank and in the Mid-Atlantic and – except for a pair of ten minute squares east of Cape Hatteras – does not extend south of Delaware Bay. The proposed map includes

nearshore waters in the Gulf of Maine and off New Jersey that were not included in the original 1998 map.

The proposed EFH maps for juvenile and adult silver hake are based on the distributions of depths and bottom temperatures that were either associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. They are also based on average catch per tow data for juveniles and adults in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75th percentile of catch level, and they include inshore areas where juvenile or adult silver hake were caught in 10% or more of the tows made in individual ten minute squares during state trawl surveys and ELMR information (north of Cape Cod only, see footnote). The proposed juvenile and adult designations were referred to as 3C alternatives in the Phase 1 DEIS.[37] Because juvenile silver hake primarily occupy distinct depth ranges in the spring (140-400 m) and fall (40-100 m), the proposed EFH map has distinct spring and fall habitat data layers that are based on depth and bottom temperature; EFH for the benthic life stages of all the other species (except red hake) was mapped based on seasonal bottom temperature preferences and an annual depth range (for more details, see Appendix A).

The proposed EFH map for juvenile silver hake includes less area on Georges Bank and in the Mid-Atlantic than the status quo map. There is a high degree of coverage in the Gulf of Maine in both maps, although the proposed map excludes the 30-40 meter depth range and includes all the nearshore area. The proposed designation would also cause a shift in EFH from the mid-shelf to the inner shelf area off New Jersey and eliminate EFH in nearshore waters south of Long Island. The proposed and status quo EFH maps for adult silver hake are similar, however, small amounts of EFH area have been added in Long Island Sound, in Narragansett Bay and coastal waters south of Cape Cod, and off northern New Jersey and Cape May. There is also a large area in deep water southeast of Long Island that is only partially included in the status quo map. The proposed juvenile and adult text descriptions refer to benthic and pelagic habitats, not just bottom habitats, and specify substrate types instead of defining EFH as occurring on "all" substrates.

Modifications to the approved juvenile EFH alternative did not involve any change in depth ranges, but did substantially expand the bottom temperature ranges used in the map. An increase in the maximum fall water temperature from 10.5 to 18.5°C caused a number of ten minute squares on Georges Bank and in the Mid-Atlantic to be added to the map. It is not clear what changes occurred in the Gulf of Maine since the approved map in the DEIS was not correct (see footnote). The modified adult EFH map includes

[37] The 3C juvenile silver hake in the DEIS was not done correctly: it should have included deep water basins in the Gulf of Maine that were within the maximum depth for this species (400 m).

new areas in the Gulf of Maine and on the inner and outer continental shelf between 70 and 120 meters that were not mapped originally when the depth range was 120-400 versus 70-400 meters.

Text descriptions:
Essential fish habitat for silver hake (*Merluccius bilinearis*) is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 10 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs and Larvae: Pelagic habitats from the Gulf of Maine to Cape May, New Jersey, including Cape Cod and Massachusetts Bays (see Map 39 and Table 10).

Juveniles: Pelagic and benthic habitats in the Gulf of Maine, including the coastal bays and estuaries listed in Table 10, and on the continental shelf as far south as Cape May, New Jersey (see Map 40), to a maximum depth of 400 meters on mud, sand, and pebbly substrates. Juvenile silver hake are sometimes found in bottom depressions or in association with sand waves and shell fragments. Young-of-the-year juveniles are sometimes found in association with amphipod tubes.

Adults: Pelagic and benthic habitats in the Gulf of Maine, including the coastal bays and estuaries listed in Table 10, and on the outer continental shelf on Georges Bank and the northern portion of the Mid-Atlantic Bight (see Map 41), to a maximum depth of 400 meters on mud, sand, and pebbly substrates. Adult silver hake are sometimes found in bottom depressions or in association with sand waves and shell fragments.

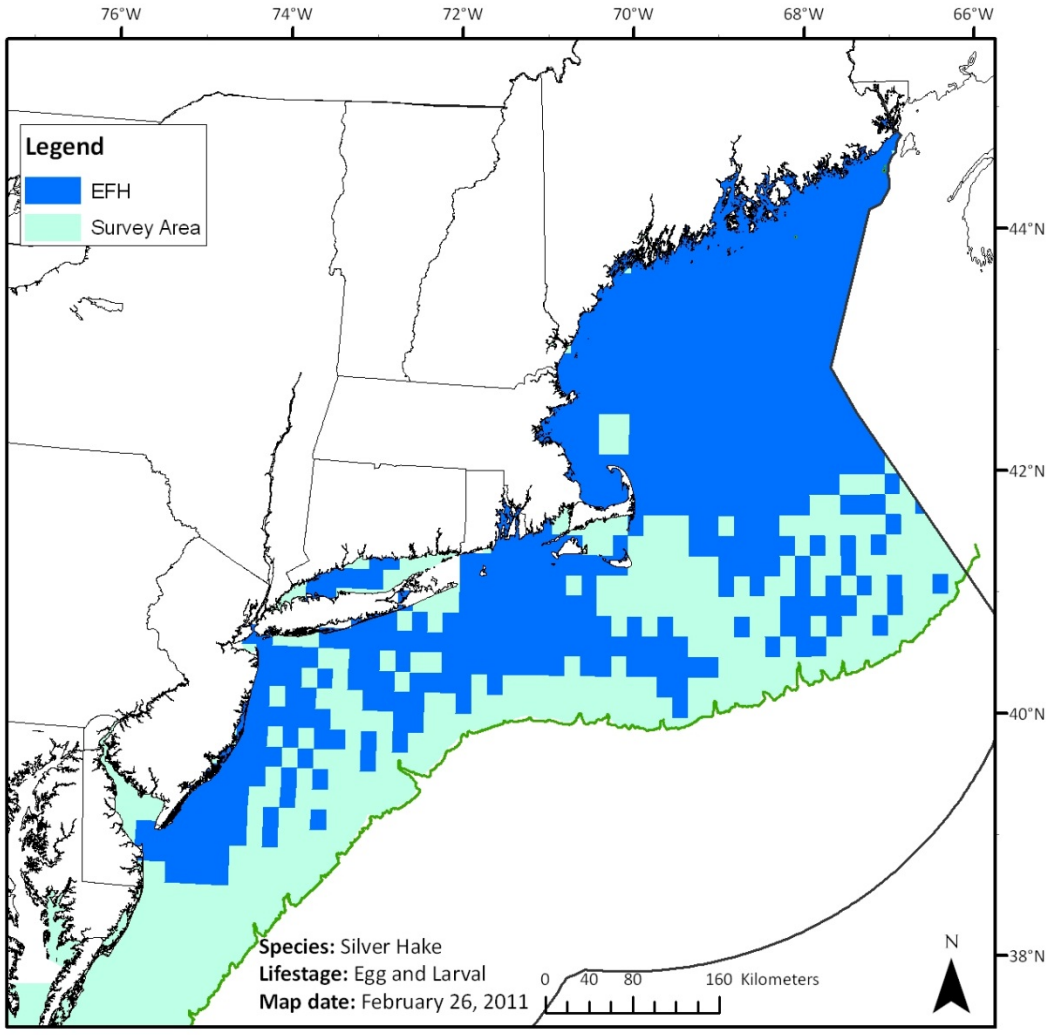
Table 10 – Silver hake EFH designation in estuaries and embayments

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay			S,M	S,M
Englishman/Machias Bay			S,M	S,M
Narraguagus Bay			S,M	S,M
Blue Hill Bay			S,M	S,M
Penobscot Bay			S,M	S,M
Muscongus Bay			S,M	S,M
Damariscotta River			S,M	S,M
Sheepscot River			S,M	S,M
Kennebec / Androscoggin			S,M	S,M
Casco Bay			S,M	S,M
Saco Bay			S,M	S,M
Massachusetts Bay	S	S	S	S

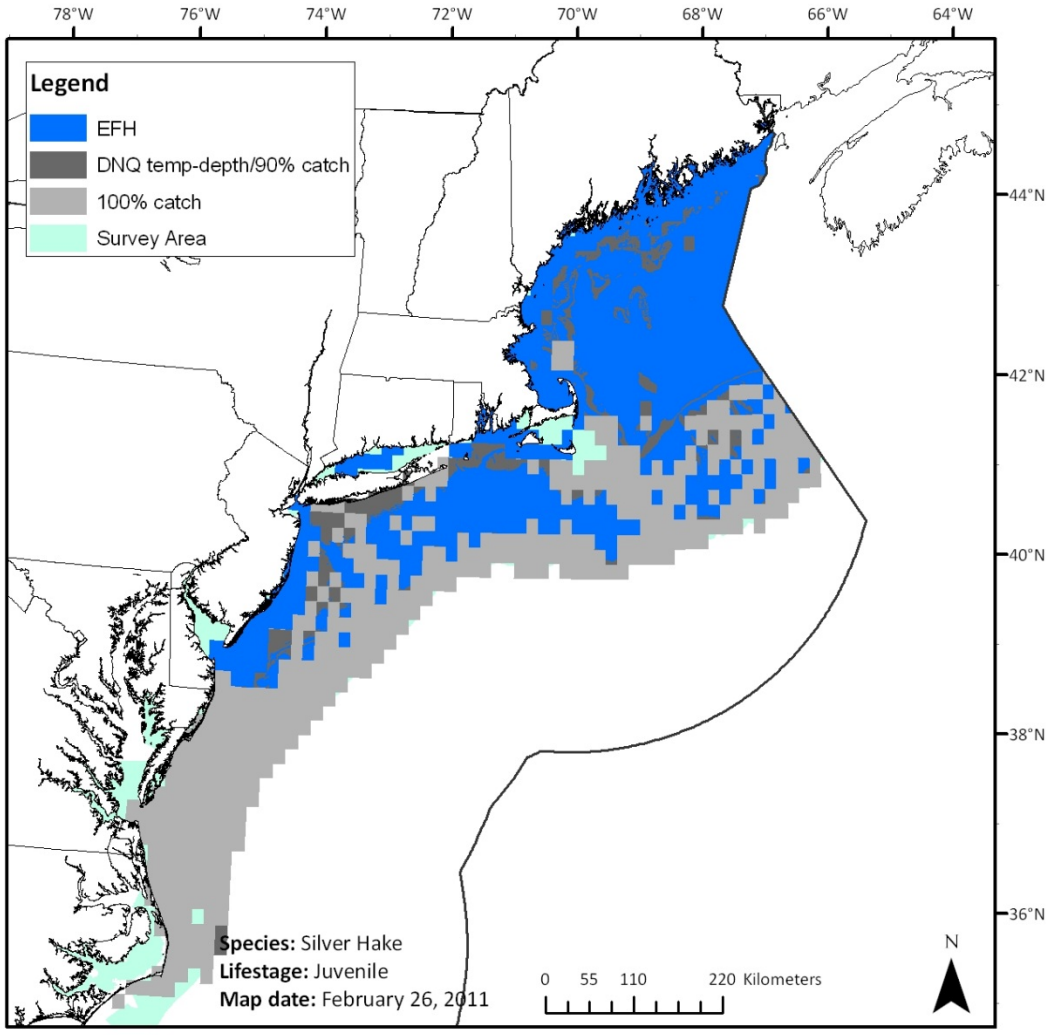
Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Boston Harbor	S	S	S,M	S,M
Cape Cod Bay	S	S	S	S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

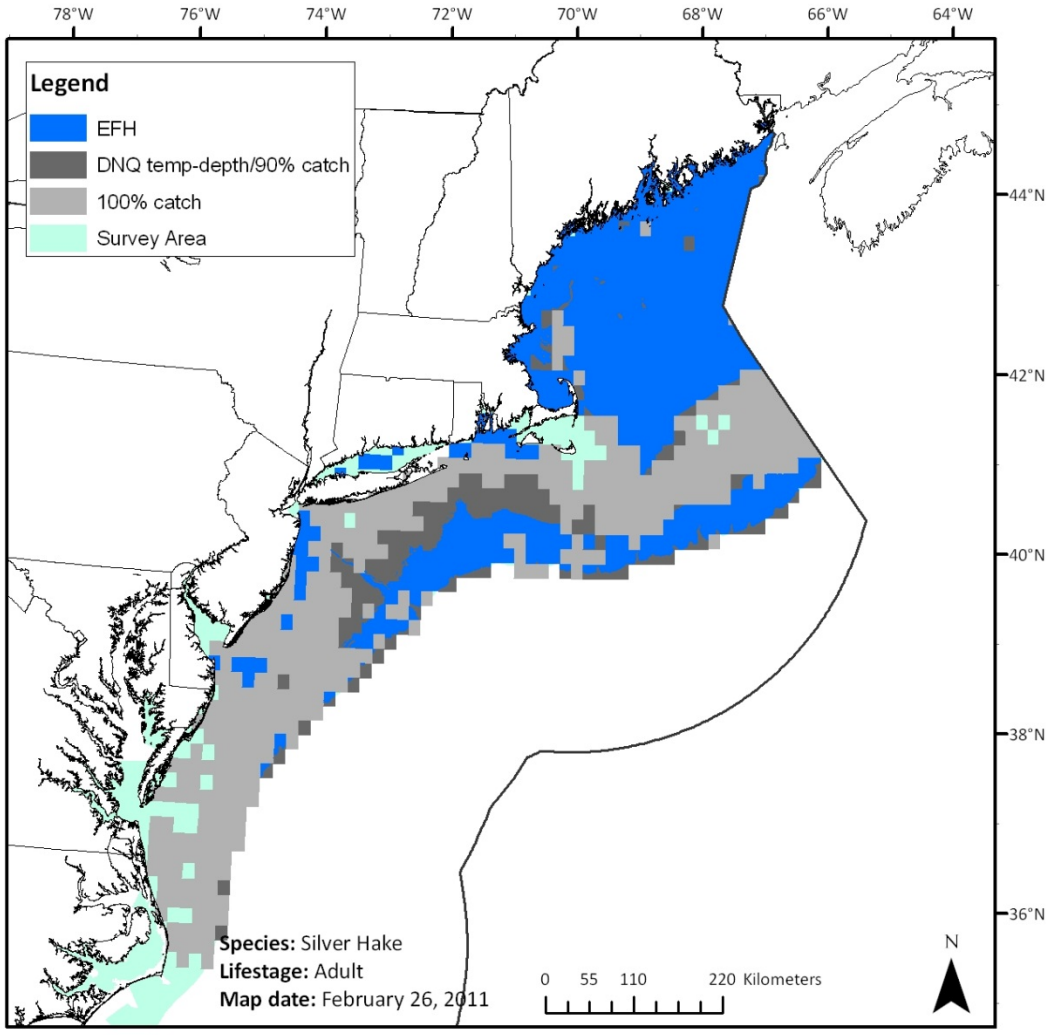
Map 39 – Silver hake egg and larval EFH.



Map 40 – Silver hake juvenile EFH.



Map 41 – Silver hake adult EFH.



1.3.4 Offshore hake

The proposed EFH designation maps for offshore hake eggs and larvae differ slightly from the status quo maps. Although no new region-wide survey data have been collected since the MARMAP egg and larval surveys were conducted in 1977-1987, any ten minute squares that were "filled in" in the original maps have been removed (see explanation of the status quo mapping methodology in Appendix A). As in the original EFH designations, the proposed EFH maps are based on the 75th percentile of the observed range of the survey data using the original data transformation (see Appendix A). The continental slope was added to the proposed EFH text descriptions.

There is a single proposed EFH map for juvenile and adult offshore hake which is based on the distributions of depths and bottom temperatures that were associated with high

catch rates of juveniles and adults in the 1963-2003 spring and fall NMFS trawl surveys and on the abundance of juveniles in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch level, but excludes a couple of ten minute squares in the Gulf of Maine.[38] It also includes continental slope habitats that were defined using known maximum depth and geographic range information (see Table A-10). The range of this species extends to Florida and into the Gulf of Mexico in deep water, but EFH was not designated south of Cape Fear, North Carolina, because no survey data are available. The combined juvenile and adult designation was referred to as Alternative 5 (juvenile 3E and adult 3D) in the Phase 1 DEIS.

The proposed new map for juvenile and adult offshore hake defines EFH as a depth range along the outer continental shelf and slope rather than discrete ten minute squares. It also eliminates the few scattered ten minute squares in the Gulf of Maine that are in the status quo map for juveniles and extends EFH a little further south of Cape Hatteras. The proposed juvenile and adult offshore hake text descriptions define EFH as extending to 750 meters: the status quo designations were limited to the continental shelf and identified 170-350 and 150-380 meters as depths where juveniles are adults "are found." The new designations also refer to pelagic and benthic habitats, reflecting the fact that the juveniles and adults of this species are not strictly demersal.

Text descriptions:
Essential fish habitat for offshore hake (*Merluccius albidus*) is designated anywhere within the geographic areas that are shown on the following maps and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Pelagic habitats along the outer continental shelf and slope between 100 and 1500 meters as shown on Map 42.

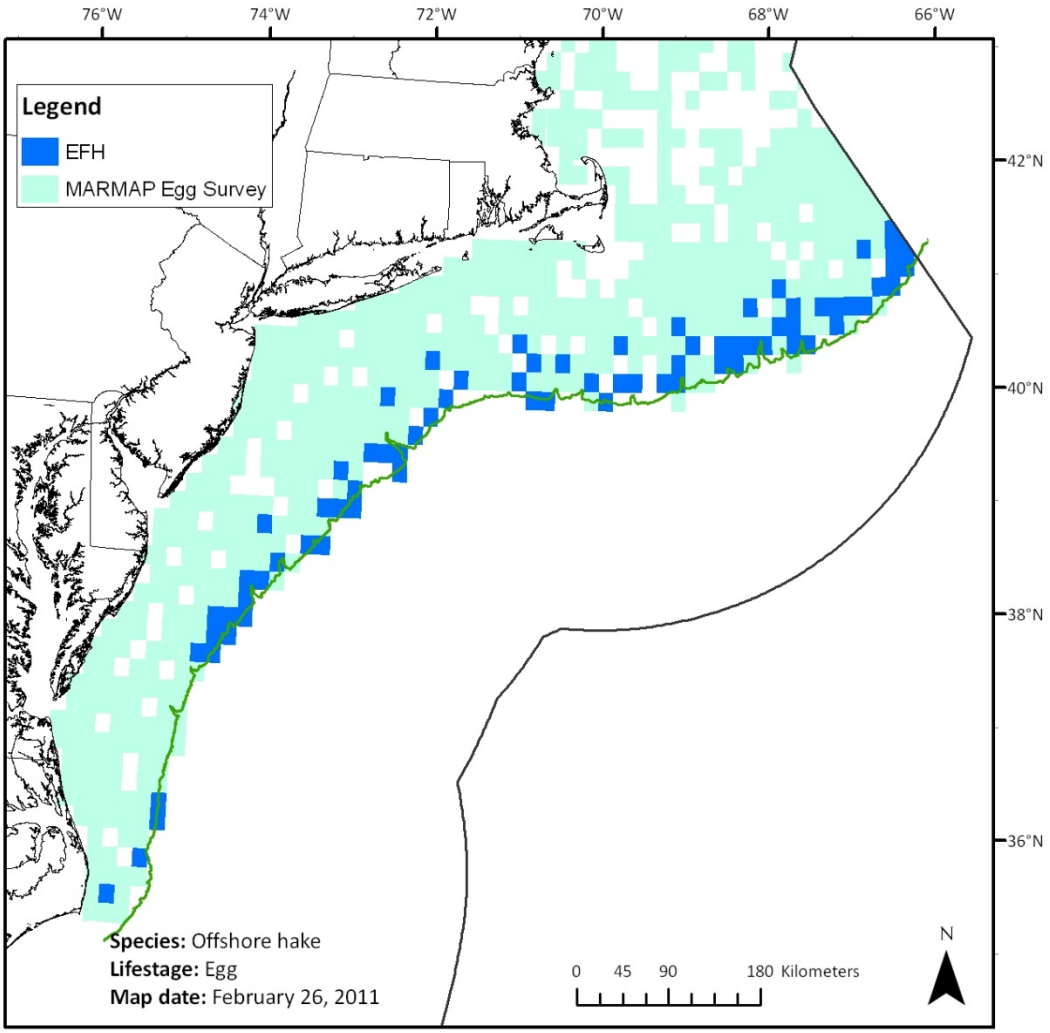
Larvae: Pelagic habitats along the outer continental shelf and slope between 60 and 1500 meters as shown on Map 43**.**

Juveniles: Pelagic and benthic habitats on the outer continental shelf and slope in depths of 160 – 750 meters as shown on Map 44.

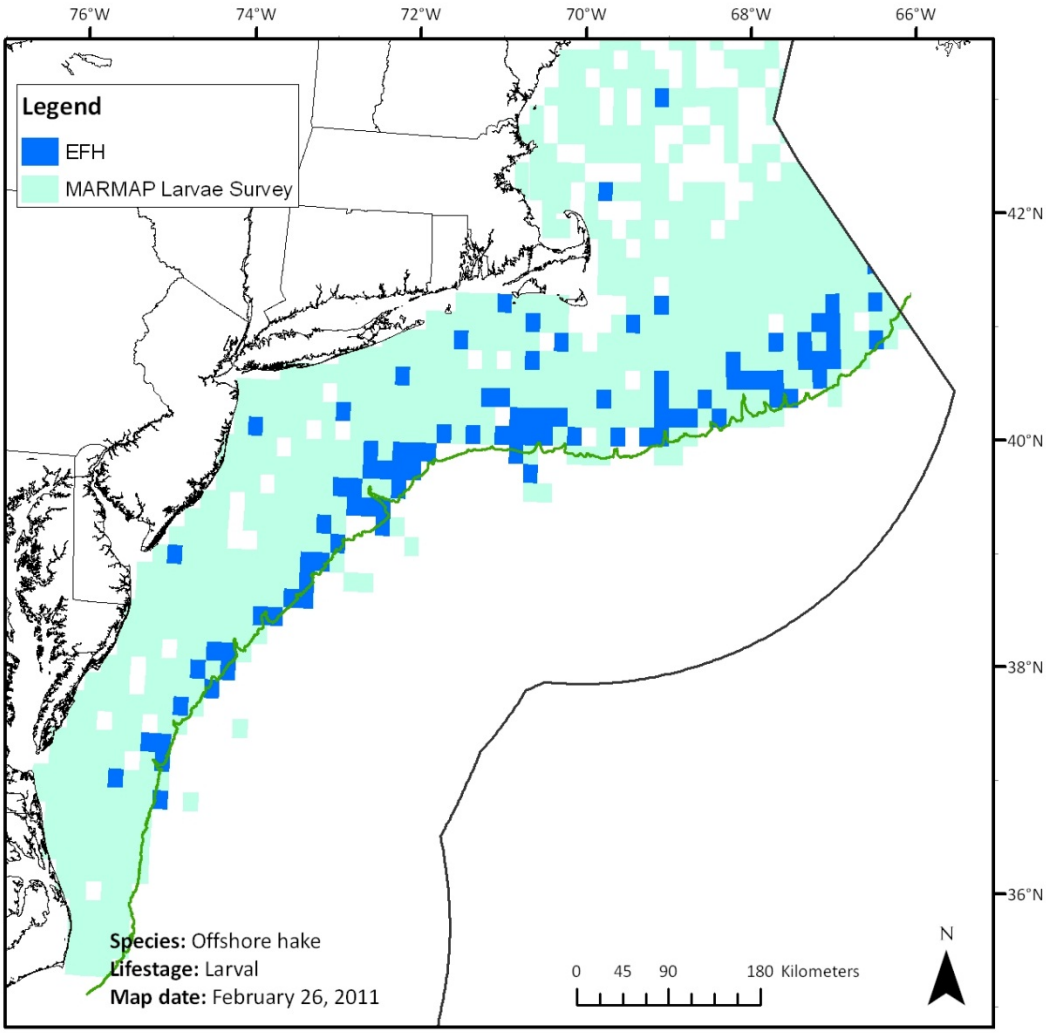
Adults: Pelagic and benthic habitats on the outer continental shelf and slope in depths of 200 – 750 meters as shown on Map 44. Spawning generally occurs between 330 and 550 meters.

[38] Catch rates of adults in the spring and fall surveys during 1968-2005 were very low, so only the juvenile catch data were used in the map.

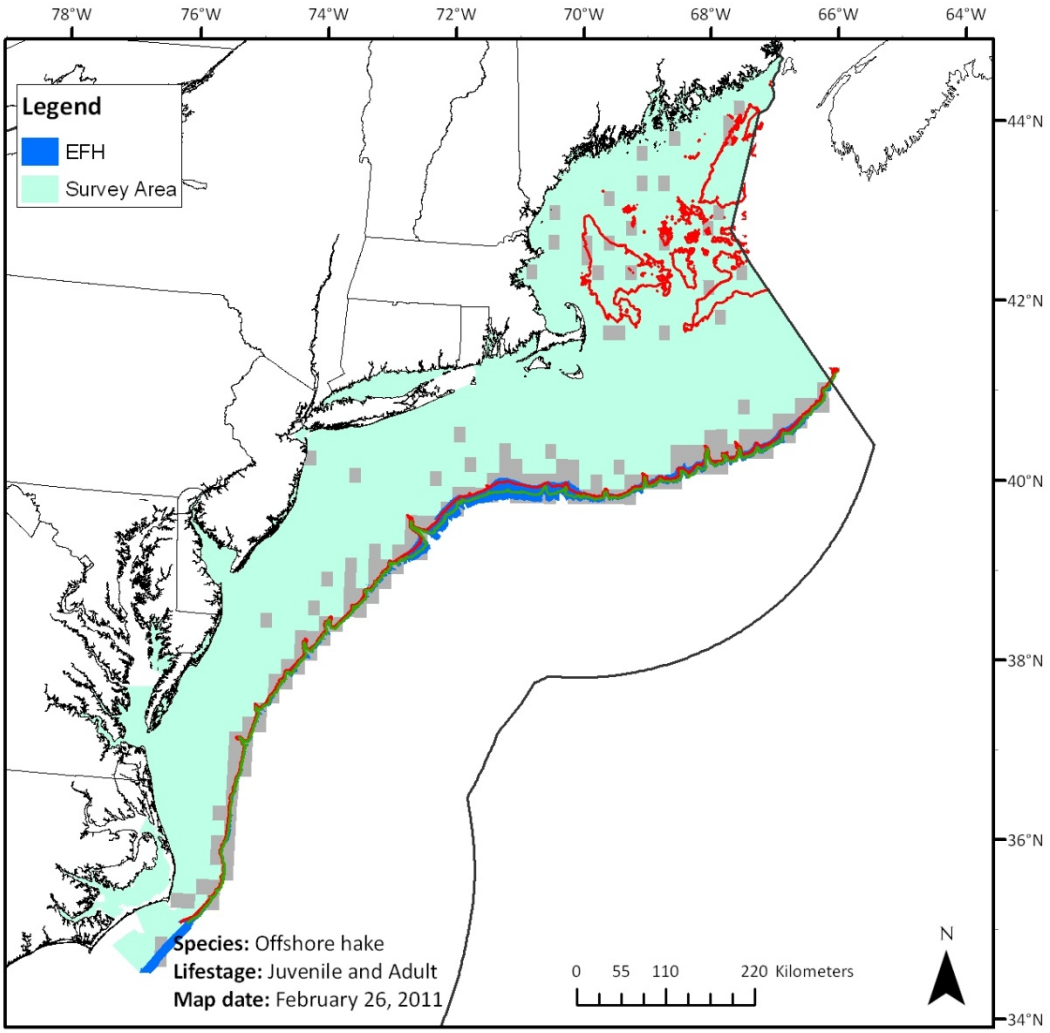
Map 42 – Offshore hake egg EFH.



Map 43 – Offshore hake larval EFH.



Map 44 – Offshore hake juvenile and adult EFH.



1.4 Skates

1.4.1 Smooth skate

There is no information available on the habitat associations or distribution of the egg stage for this species. Also, there is no larval stage for any of the skates because they emerge from their egg cases as fully developed juveniles. Therefore, there is no proposed EFH designation for either life stage.

The proposed EFH maps for juvenile and adult smooth skate are based on the distributions of depths and bottom temperatures that are associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. The maps are also based on average catch per tow data for juveniles and adults

in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch level, and include inshore areas where juvenile or adult smooth skate were caught in 10% or more of the tows made in individual ten minute squares during state trawl surveys. Based on the ELMR information for skates (not identified to species) and the known geographic range of this species (see Appendix A), EFH for juvenile smooth skates was added to the proposed map for the high salinity portions of bays and estuaries along the Maine and New Hampshire coasts. The proposed EFH designations also include maximum depth and geographic range information for the continental slope. These designations were 3D alternatives in the Phase 1 DEIS.

The proposed text descriptions for juvenile and adult smooth skate define EFH on the continental slope as well as in the Gulf of Maine. They also extend the minimum depth into deeper water in the Gulf of Maine (100 vs 30 meters). The proposed EFH map for juvenile smooth skate covers a more continuous area in the outer Gulf of Maine than the status quo map. It also includes inshore bays and estuaries that were left out of the original map. Because the original map for the adults was based solely on survey data, it only included a few ten minute squares. The proposed adult EFH map, which includes a preferred habitat layer, is much more representative of EFH for adults of this species in the outer Gulf of Maine and along the continental slope. Expansions of the depth ranges for both life stages (from 120-400 to 100-400 m for the juveniles and from 120-300 to 100-400 m for the adults) caused an enlargement of the proposed EFH maps to cover more area in the Gulf of Maine.

Text descriptions:
For smooth skate (*Malacoraja senta*), essential fish habitat is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 11 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Juveniles: Benthic habitats between 100 and 400 meters in the Gulf of Maine, on the continental slope to a depth of 900 meters, and in depths less than 100 meters in the high salinity zones of a number of bays and estuaries along the Maine coast, as shown on Map 45 and listed in Table 11. EFH for juvenile smooth skates occurs mostly on soft mud in deeper areas, but also on sand, broken shells, gravel, and pebbles on offshore banks in the Gulf of Maine.

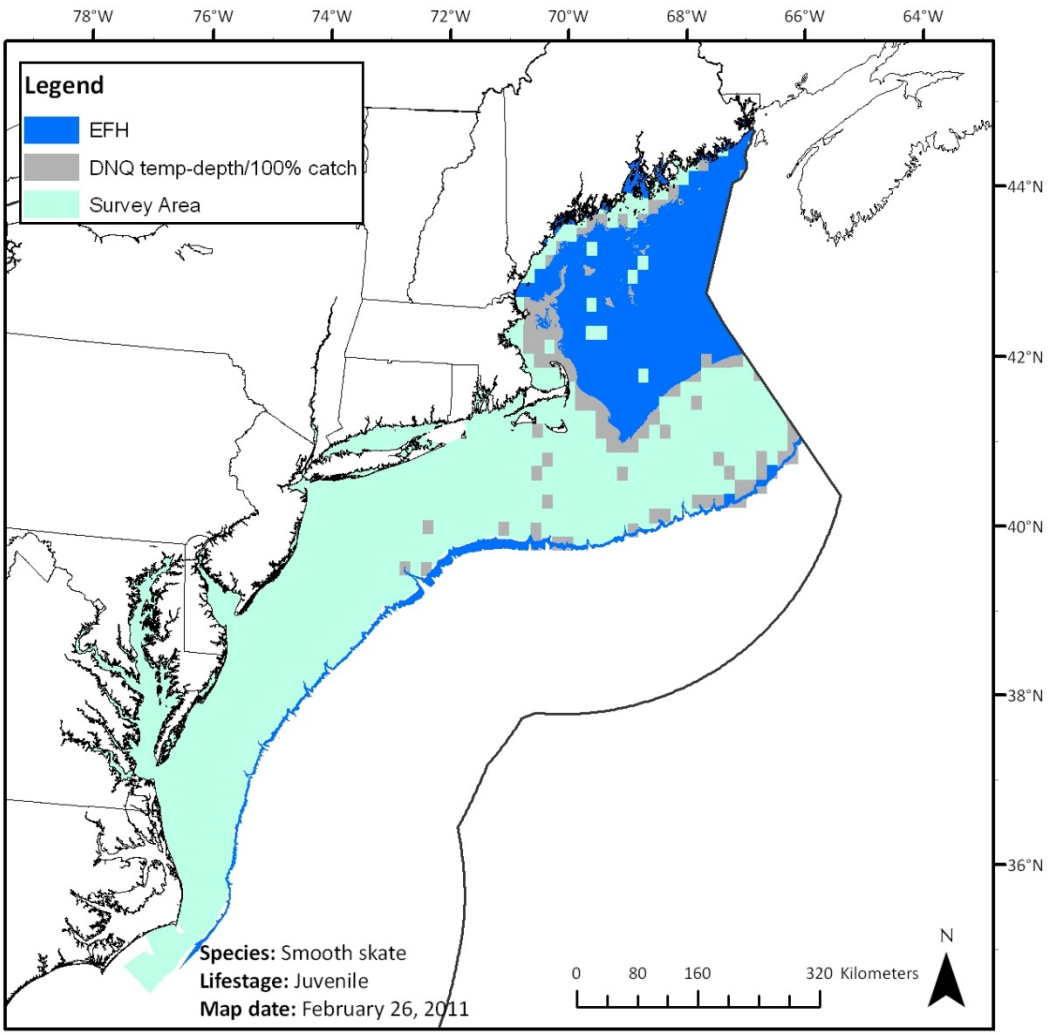
Adults: Benthic habitats between 100 and 400 meters in the Gulf of Maine and on the continental slope to a depth of 900 meters, as shown on Map 46. EFH for juvenile smooth skates occurs mostly on soft mud in deeper areas, but also on sand, broken shells, gravel, and pebbles on offshore banks in the Gulf of Maine.

Table 11 – Smooth skate EFH designation for estuaries and embayments.

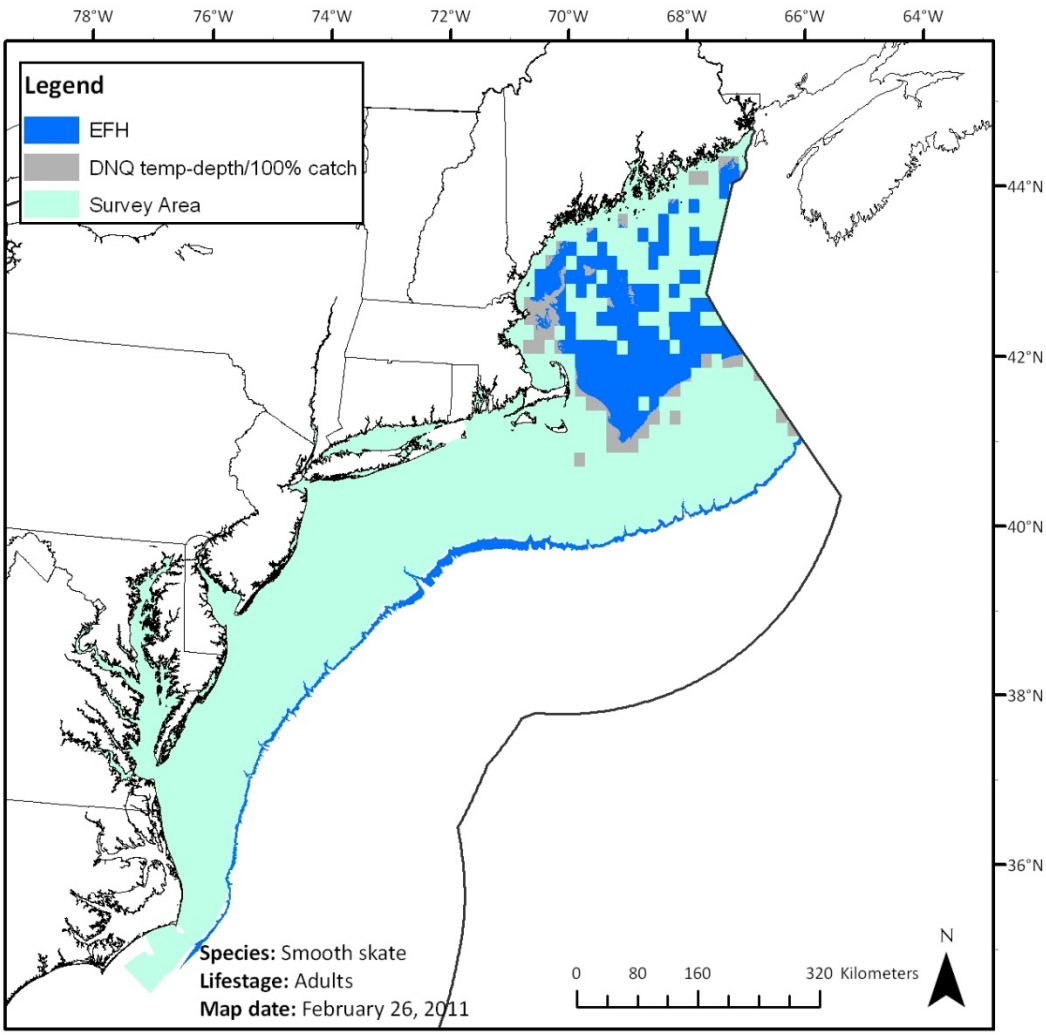
Estuaries and Embayments	Juveniles	Adults
Passamaquoddy Bay	S	
Englishman/Machias Bay	S	
Narraguagus Bay	S	
Blue Hill Bay	S	
Penobscot Bay	S	
Muscongus Bay	S	
Damariscotta River	S	
Sheepscot River	S	
Kennebec / Androscoggin	S	
Casco Bay	S	
Saco Bay	S	
Great Bay	S	

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

Map 45 – Smooth skate juvenile EFH.



Map 46 – Smooth skate adult EFH.



1.4.2 Thorny skate

There is no information available on the habitat associations or distribution of the egg stage for this species. There is also no larval stage for any of the skates because they emerge from their egg cases as fully developed juveniles. Therefore, there is no proposed EFH designation for either of these life stages.

The proposed EFH maps for juvenile and adult thorny skate are based on the distributions of depths and bottom temperatures that were either associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. They are also based on average catch per tow data for juveniles and adults in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75th (juveniles) and 90th (adult) percentiles of catch, and

include inshore areas where juvenile and adult thorny skate were caught in 10% or more of the tows made in individual ten minute squares during state trawl surveys. Based on the ELMR information for skates (not identified to species) and the known geographic range of this species (see Appendix A), EFH for juvenile thorny skates was added to the proposed map for the high salinity portions of bays and estuaries in the Gulf of Maine. The proposed EFH designations also include maximum depth and geographic range information for the continental slope. The juvenile designation was Alternative 3C in the Phase 1 DEIS and the adult designation was 3D.

The proposed EFH text descriptions for each life stage are distinct whereas in the status quo designations, they are identical. For both life stages, the proposed maximum depth is 900 instead of 2000 meters. The proposed juvenile map includes inshore bays and estuaries that were left out of the original EFH map. The proposed adult map includes much more of the outer Gulf of Maine than the status quo map. Both proposed maps add the continental slope down to 900 meters. As modified, the proposed adult EFH designation for thorny skate extends into shallower water (80 vs 120 m); there were no changes to the juvenile depth range, and, thus, no significant changes in the map.

Text description:
For thorny skate (*Amblyraja radiata*), essential fish habitat is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 12 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Juveniles: Benthic habitats in the Gulf of Maine to a maximum depth of 400 meters, on the continental slope to a depth of 900 meters, and in the high salinity zones of a number of bays and estuaries north of Cape Cod, as shown on Map 47 and listed in Table 14. EFH for juvenile thorny skate includes a wide range of bottom types from soft mud to gravel, broken shells, and pebbles.

Adults: Benthic habitats between 80 and 300 meters in the Gulf of Maine and on the continental slope to a depth of 900 meters, as shown on Map 48 and listed in Table 14. EFH for adult thorny skate includes a wide range of bottom types from soft mud to gravel, broken shells, and pebbles.

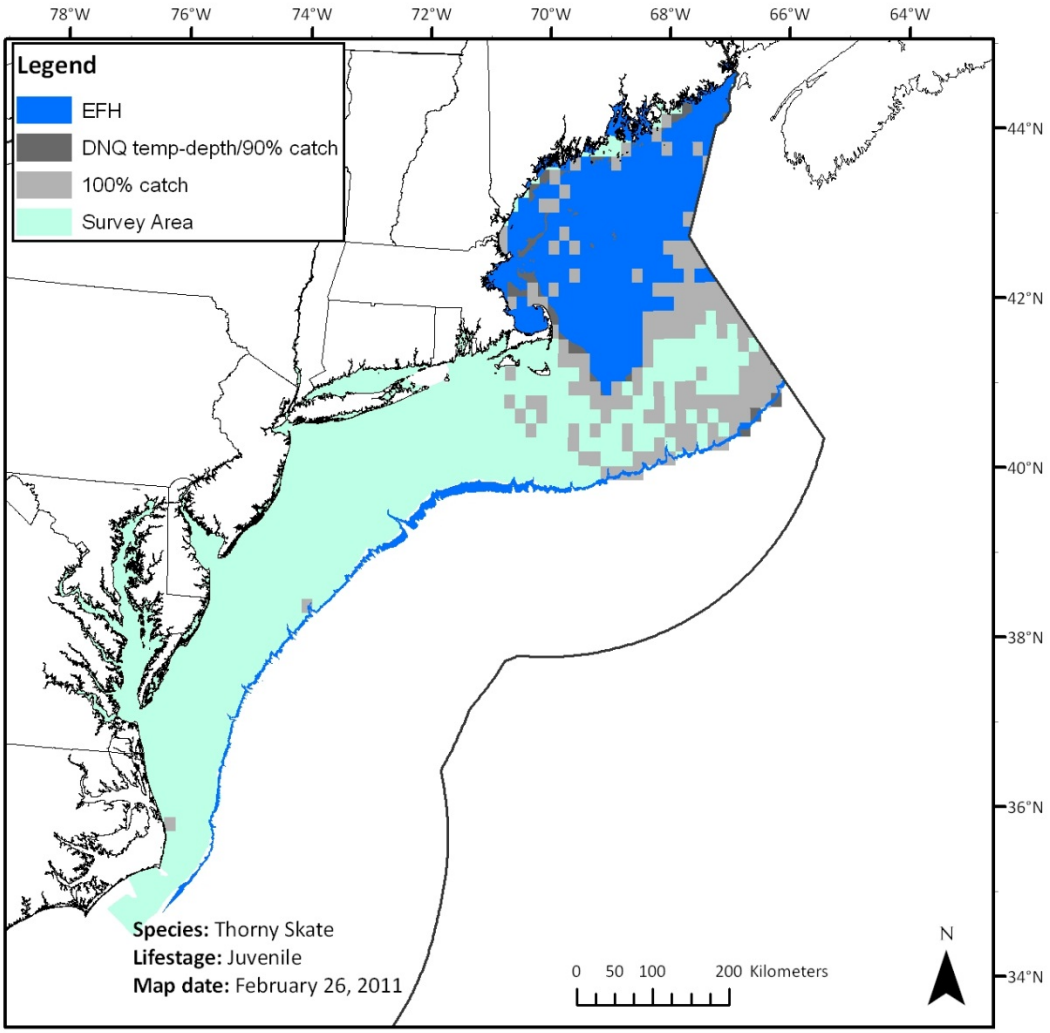
Table 12 – Thorny skate EFH designation for estuaries and embayments.

Estuaries and Embayments	Juveniles	Adults
Passamaquoddy Bay	S	
Englishman/Machias Bay	S	
Narraguagus Bay	S	
Blue Hill Bay	S	
Penobscot Bay	S	

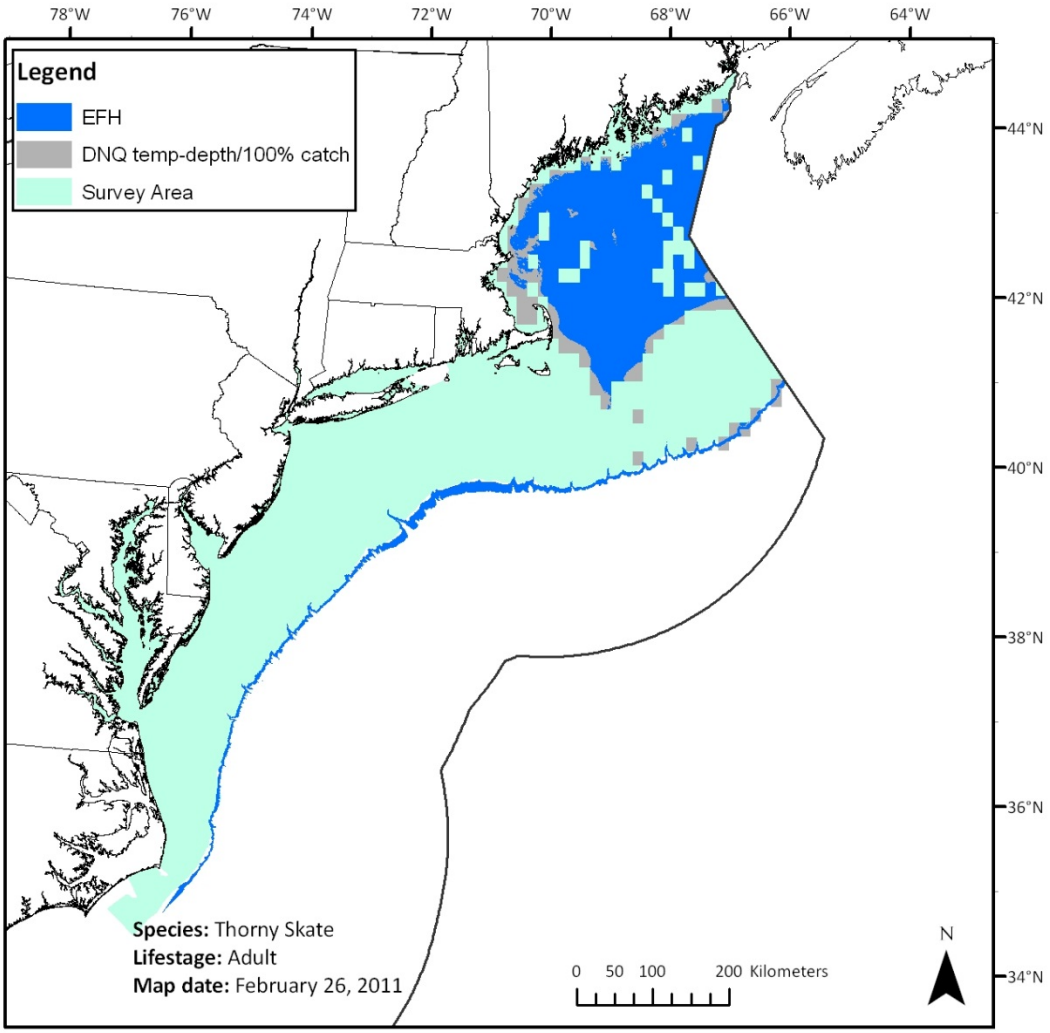
Estuaries and Embayments	Juveniles	Adults
Muscongus Bay	S	
Damariscotta River	S	
Sheepscot River	S	
Kennebec / Androscoggin	S	
Casco Bay	S	
Saco Bay	S	
Great Bay	S	
Hampton Harbor*	S	
Plum Island Sound*	S	
Massachusetts Bay	S	
Boston Harbor	S	
Cape Cod Bay	S	

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

Map 47 – Thorny skate juvenile EFH.



Map 48 – Thorny skate adult EFH.



1.4.3 Barndoor skate

As was the case when the original EFH designations for this species were implemented, there is no information available on the habitat associations or distribution of the egg stage for this species. Also, there is no larval stage for any of the skates because they emerge from their egg cases as fully developed juveniles. Therefore, there is no proposed EFH designation for either life stage.

The proposed EFH map for juvenile and adult barndoor skate on the continental shelf is based on the distribution of depths and bottom temperatures that were either associated with high catch rates of juveniles and adults in the 1963-2003 spring and fall NMFS trawl surveys, or were identified in the EFH Source Document for this species. It is also based on average catch per tow data for juveniles in ten minute squares of latitude and

longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch level, and includes areas on the continental slope where barndoor skate were determined to be present, based on the reported maximum depth and geographic range of the species.[39] These juvenile and adult designations were referred to as alternative 3D in the Phase 1 DEIS.

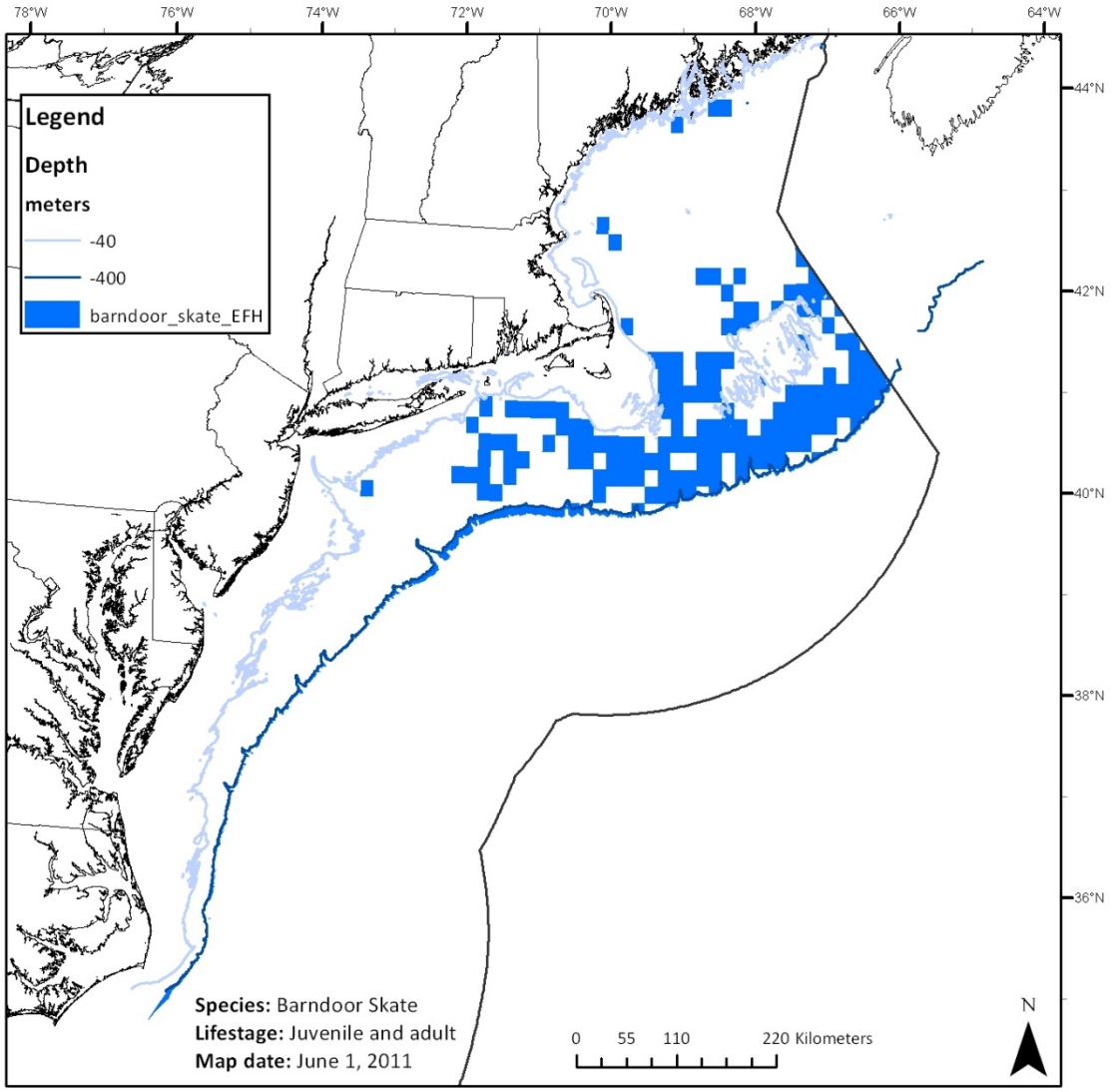
The proposed new EFH map for barndoor skate juveniles and adults extends primarily over the southern portion of Georges Bank, into southern New England, and along the continental slope. The status quo maps – which were done separately for juveniles and adults – designated EFH in just a few randomly scattered ten minute squares, mostly on Georges Bank. Because it incorporates habitat features in addition to survey catch data, the proposed EFH map extends over a more continuous geographic area. The separate text descriptions that were approved in 2007 were combined into a single description with some specific depth information for each life stage.

Text descriptions:
For barndoor skate (*Dipturus laevis*), essential fish habitat is designated anywhere within the geographic areas that are shown on Map 49 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Juveniles and Adults: Benthic habitats on the continental shelf, primarily on Georges Bank and in southern New England, in depths of 40 – 400 meters, and on the continental slope to a maximum depth of 750 meters, as shown on Map 49. EFH for juvenile and adult barndoor skates occurs on mud, sand, and gravel substrates. Both life stages are usually found on the continental shelf in depths less than 160 meters, but the adults also occupy benthic habitats between 300 and 400 meters on the outer shelf.

[39] Very few adults are caught in the NMFS trawl survey, so survey data for juveniles were used to correlate catch with habitat features and to map the distribution of both life stages on the shelf.

Map 49 – Barndoor skate juvenile and adult EFH.



1.4.4 Little skate

As was the case when the original EFH designations for this species were developed, there is no information available on the habitat associations or distribution of the egg stage for this species. Also, there is no larval stage for any of the skates because they emerge from their egg cases as fully developed juveniles. Therefore, there is no proposed EFH designation for either life stage.

The proposed EFH maps for juvenile and adult little skate are based on the distribution of depths and bottom temperatures that are associated with high catch rates of juveniles or adults in the 1963-2003 spring and fall NMFS trawl surveys. Depth and bottom temperature information from the EFH Source Document was used to supplement survey information as needed. The proposed new maps are also based on average catch

per tow data for juveniles and adults, respectively, in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75th percentile of catch level, and they include inshore areas where juvenile or adult little skate were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys and ELMR information. The ELMR information for the Mid-Atlantic area was re-interpreted to add EFH for juvenile little skate to five inshore areas south of Raritan Bay, including Delaware Bay, and to eliminate the status quo designations for juveniles and adults in Chesapeake Bay (see Appendix A). Some of the estuaries and embayments north of Cape Cod that were not originally designated as EFH were also added to the new maps.[40] These juvenile and adult designations were referred to as 3C alternatives in the Phase 1 DEIS.

The proposed EFH map for juvenile little skate extends over most of the continental shelf from Delaware Bay to Georges Bank (to a maximum depth of 80 meters) and includes considerably more coastal waters in the Gulf of Maine than the original EFH map. The status quo map – because it was based on 100% of the NMFS survey data – extends all the way to the shelf break. The status quo and proposed new EFH maps for adult little skate are more similar than the juvenile maps, but there are some differences. As proposed, EFH would include more coastal waters in New Jersey and the Gulf of Maine. Chesapeake Bay would no longer be designated as EFH for little skate (juveniles or adults) if the proposed designations are approved and the high salinity zones of nearly all the ELMR areas north of Cape Cod would be added to the designations. The level 2 EFH depth information provided for both life stages in the status quo text descriptions is the same, and is very restricted (73-91 m), as opposed to the broader depth ranges identified in the proposed descriptions, which would extend EFH more explicitly into nearshore waters with maximum depths of 80 (juveniles) and 100 (adults) meters. The substrate information in the status quo and proposed new designations is the same.

As modified, the proposed map for juvenile little skates extends into deeper water (80 vs. 70 meters) and thus includes more of the continental shelf than the map that was approved in June 2007; it also excludes Chesapeake Bay. The modified adult map is very similar to the original approved map since the maximum depth did not change. The only noticeable changes are the addition of shallow water on Georges Bank (the minimum depth on the shelf was reduced from 30 to 20 meters) and the elimination of Chesapeake Bay.

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[40] For some reason, none of the original EFH designations for any of the skate species (NMFS 2002) included the ELMR areas north of Cape Cod, even though the abundance of "skates" (unidentified to species) were evaluated in the North and Mid Atlantic regions (see Jury et al. 1994 and Stone et al. 1994). This was an oversight since four of the skate species managed by the New England Fishery Management Council – including little skate – are common in the Gulf of Maine (see Appendix A).

Text descriptions:
For little skate (*Leucoraja erinacea*), essential fish habitat is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 13 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Juveniles: Sub-tidal benthic habitats in coastal waters of the Gulf of Maine, on Georges Bank, and in the Mid-Atlantic region as far south as Delaware Bay, extending from the shoreline to a maximum depth of 80 meters, as shown on Map 50, and including high salinity zones in the bays and estuaries listed in Table 13. EFH for juvenile little skates occurs on mud, sand, and gravel substrates.

Adults: Sub-tidal benthic habitats in coastal waters of the Gulf of Maine, on the continental shelf in southern New England and on Georges Bank, and in New Jersey coastal waters, extending from the shoreline to a maximum depth of 100 meters, as shown on Map 51, and including high salinity zones in the bays and estuaries listed in Table 13. EFH for adult little skates occurs on mud, sand and gravel substrates.

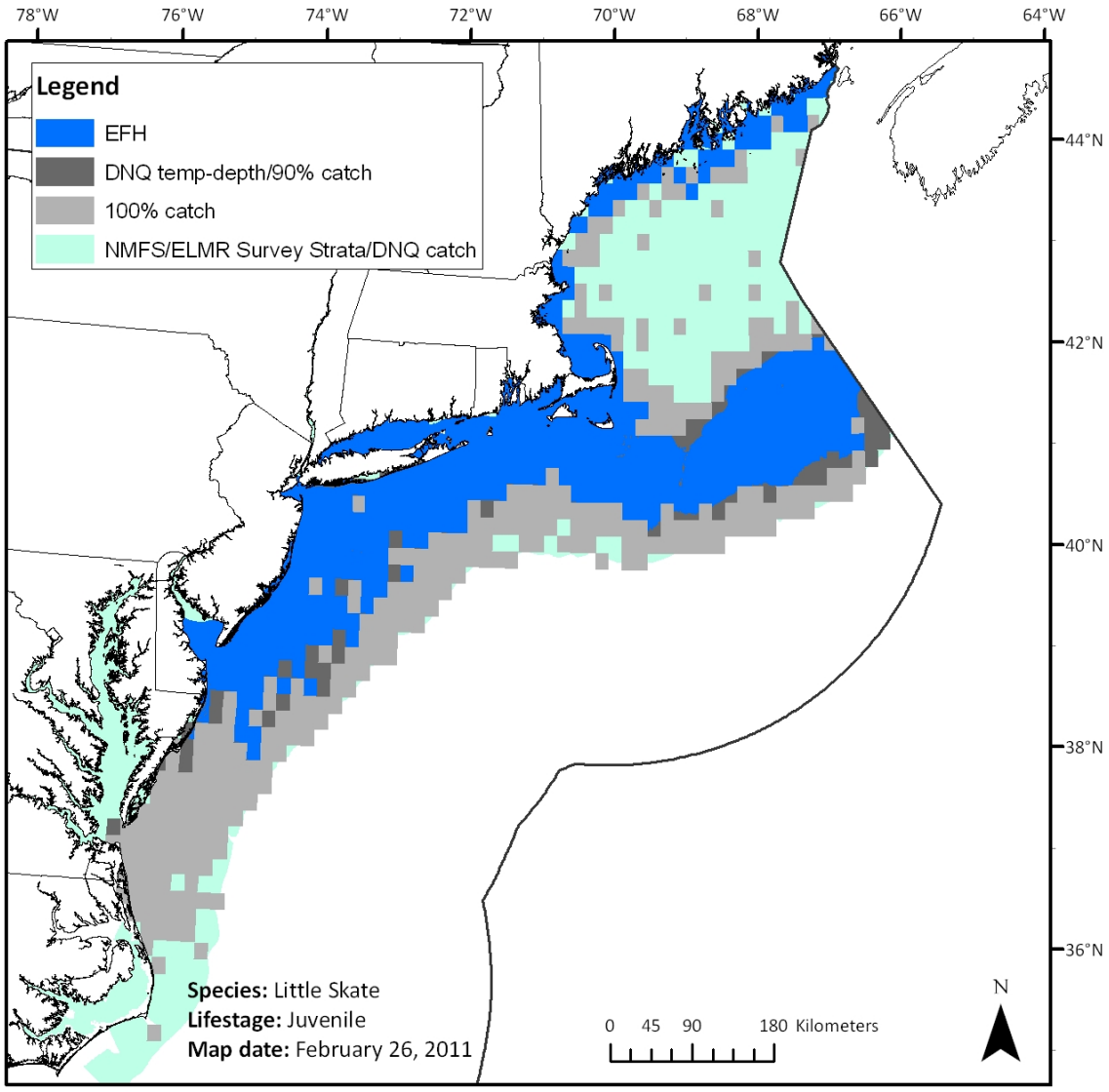
Table 13 – Little skate EFH designation for estuaries and embayments

Estuaries and Embayments	Juveniles	Adults
Passamaquoddy Bay	S	
Englishman/Machias Bay	S	
Narraguagus Bay	S	
Blue Hill Bay	S	
Penobscot Bay	S	S
Muscongus Bay	S	S
Damariscotta River	S	S
Sheepscot River	S	S
Kennebec / Androscoggin	S	S
Casco Bay	S	S
Saco Bay	S	S
Wells Harbor		
Great Bay	S	
Hampton Harbor*		
Merrimack River		
Plum Island Sound*		
Massachusetts Bay	S	S
Boston Harbor	S	S

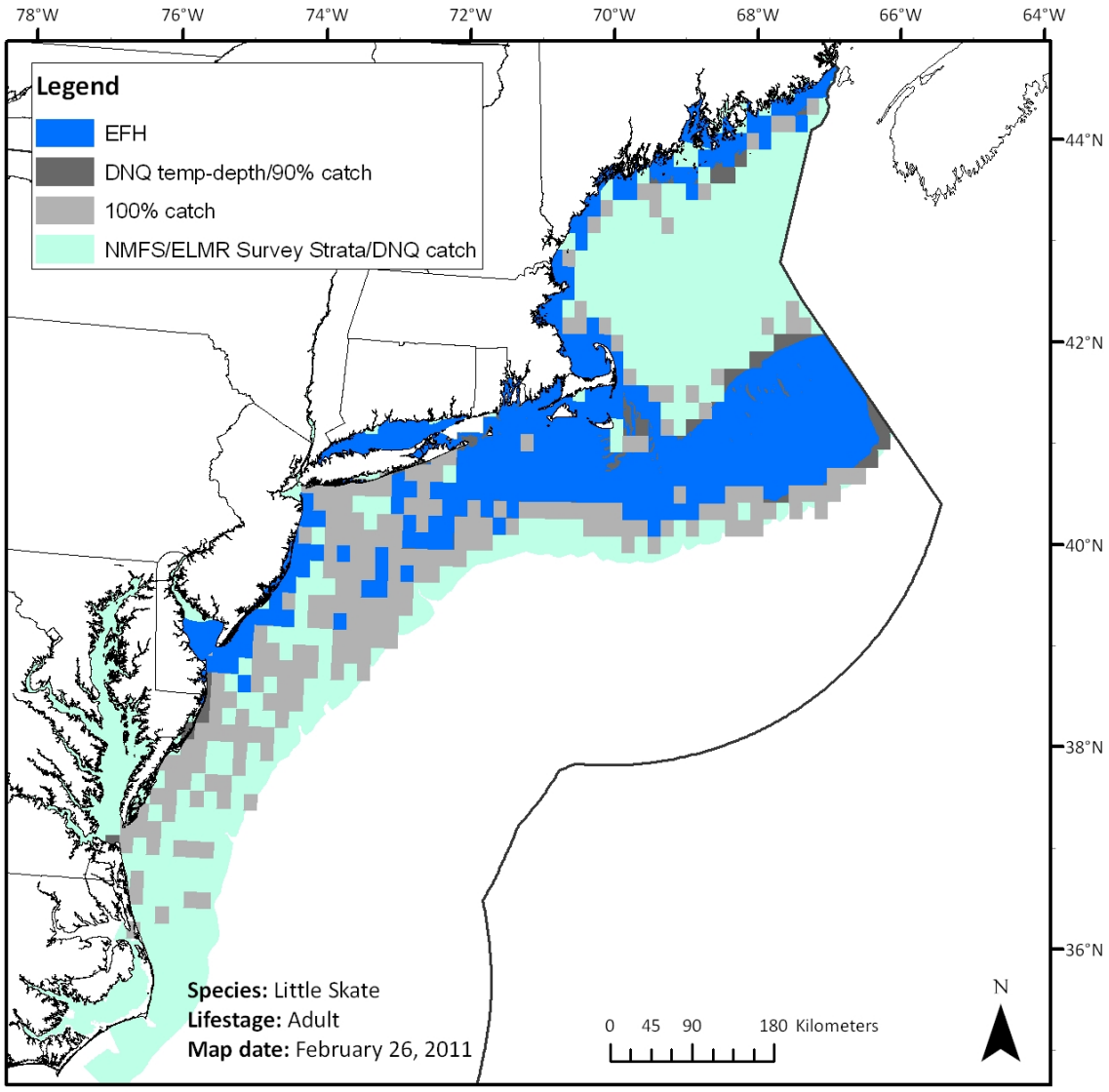
Estuaries and Embayments	Juveniles	Adults
Cape Cod Bay	S	S
Waquoit Bay		
Buzzards Bay	S	S
Narragansett Bay	S	S
Long Island Sound	S	S
Connecticut River	M	M
Gardiners Bay	S	S
Great South Bay	S	S
Hudson River / Raritan Bay	S	
Barnegat Bay	S	S
New Jersey Inland Bays	S	S
Delaware Bay	S	S
Delaware Inland Bays*	S	S
Maryland Inland Bays*	S	S
Chincoteague Bay		
Chesapeake Bay	S,M	S,M

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations*

Map 50 – Little skate juvenile EFH.



Map 51 – Little skate adult EFH.



1.4.5 Winter skate

There is no information available on the habitat associations or distribution of the egg stage for this species. There is also no larval stage for any of the skates because they emerge from their egg cases as fully developed juveniles. Therefore, there is no proposed EFH designation for either of these life stages.

The proposed EFH maps for juvenile and adult winter skate are based on the distributions of depths and bottom temperatures that were either associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. The proposed maps are also based on average catch per tow data in ten

minute squares of latitude and longitude for juveniles and adults, respectively, in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch, and they include inshore areas where juvenile or adult white hake were caught in 10% or more of the tows made in individual ten minute squares during state trawl surveys as well as coastal bays and estuaries identified in the ELMR reports. The ELMR information for the Mid-Atlantic area was re-interpreted to add EFH for juvenile winter skate to five inshore areas south of Raritan Bay, including Delaware Bay, and to eliminate the status quo designations for juveniles and adults in Chesapeake Bay (see Appendix A). Some of the ELMR estuaries and embayments north of Cape Cod that were not originally designated as EFH were also added to the new maps (see footnote for little skates). A few unsurveyed ten minute squares were filled in along the Rhode Island and Connecticut coasts and southeast of Nantucket Island. The designations are 3E alternatives in the Phase 1 DEIS.

The proposed designations would limit EFH to a maximum depth of 90 meters for juvenile winter skates and 80 meters for the adults. The depth ranges given in the status quo designations are much less specific (shoreline to 400 or 371 meters, more abundant less than 111 meters). The proposed EFH map for juvenile winter skate includes more considerably more area in the Mid-Atlantic Bight compared to the status quo map. The status quo adult map is almost completely limited to Georges Bank and the waters directly south of Cape Cod; the proposed new map extends EFH for adult winter skate to continental shelf waters south of Delaware Bay and adds more of the southwestern Gulf of Maine.

Modification of the juvenile EFH designation to include shelf waters out to 90 meters instead of 80 meters caused most of Georges Bank to "fill in" and extended EFH westwards without interruption into the Mid-Atlantic and farther out on the shelf. The other significant change was the elimination of EFH in Chesapeake Bay. Maximum depth for the adults increased by 20 meters (from 60 to 80) and had a similar effect on the proposed map: EFH now extends across the Great South Channel (except for the shoal water east of Nantucket) and Chesapeake Bay has been removed. The rest of the new map looks very much like the map that was approved in 2007.

Text descriptions:
For winter skate (*Leucoraja ocellata*), essential fish habitat is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 14 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Juveniles: Sub-tidal benthic habitats in coastal waters from eastern Maine to Delaware Bay and on the continental shelf in southern New England and the Mid-Atlantic region, and on Georges Bank, from the shoreline to a maximum depth of 90 meters, as shown on

Map 52, including the high salinity zones of the bays and estuaries listed in Table 14. EFH for juvenile winter skate occurs on mud, sand and gravel substrates,

Adults: Sub-tidal benthic habitats in coastal waters in the southwestern Gulf of Maine, in coastal and continental shelf waters in southern New England and the Mid-Atlantic region, and on Georges Bank, from the shoreline to a maximum depth of 80 meters, as shown on Map 53, including the high salinity zones of the bays and estuaries listed in Table 14. EFH for adult winter skate occurs on mud, sand and gravel substrates.

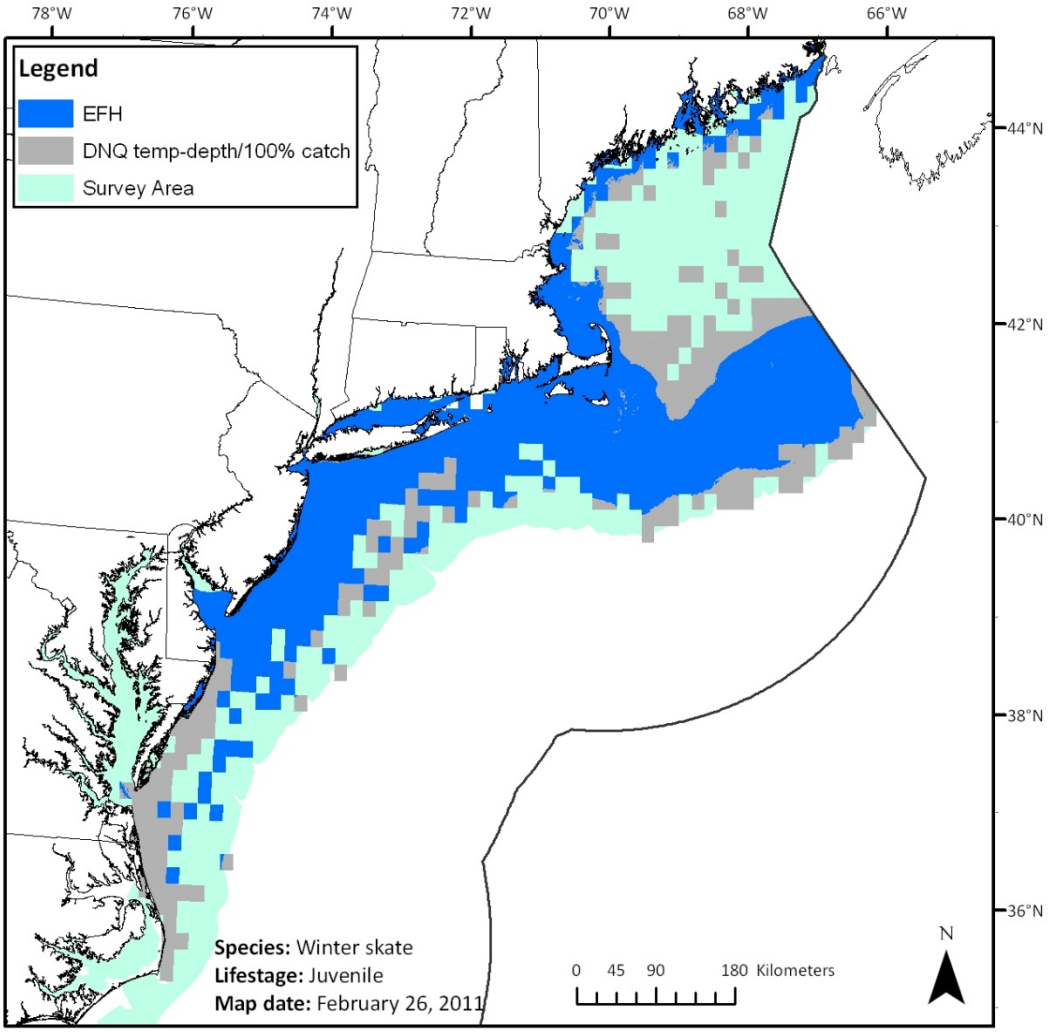
Table 14 – Winter skate EFH designation for estuaries and embayments.

Estuaries and Embayments	Juveniles	Adults
Passamaquoddy Bay	S	
Englishman/Machias Bay	S	
Narraguagus Bay	S	
Blue Hill Bay	S	
Penobscot Bay	S	
Muscongus Bay	S	
Damariscotta River	S	
Sheepscot River	S	
Kennebec / Androscoggin	S	
Casco Bay	S	
Saco Bay	S	
Great Bay	S	
Plum Island Sound*	S	
Massachusetts Bay	S	S
Boston Harbor	S	S
Cape Cod Bay	S	S
Buzzards Bay	S	S
Narragansett Bay	S	S
Long Island Sound	S	S
Connecticut River	M	M
Gardiners Bay	S	S
Great South Bay	S	S
Hudson River / Raritan Bay	S	
Barnegat Bay	S	S
New Jersey Inland Bays	S	S
Delaware Bay	S	S

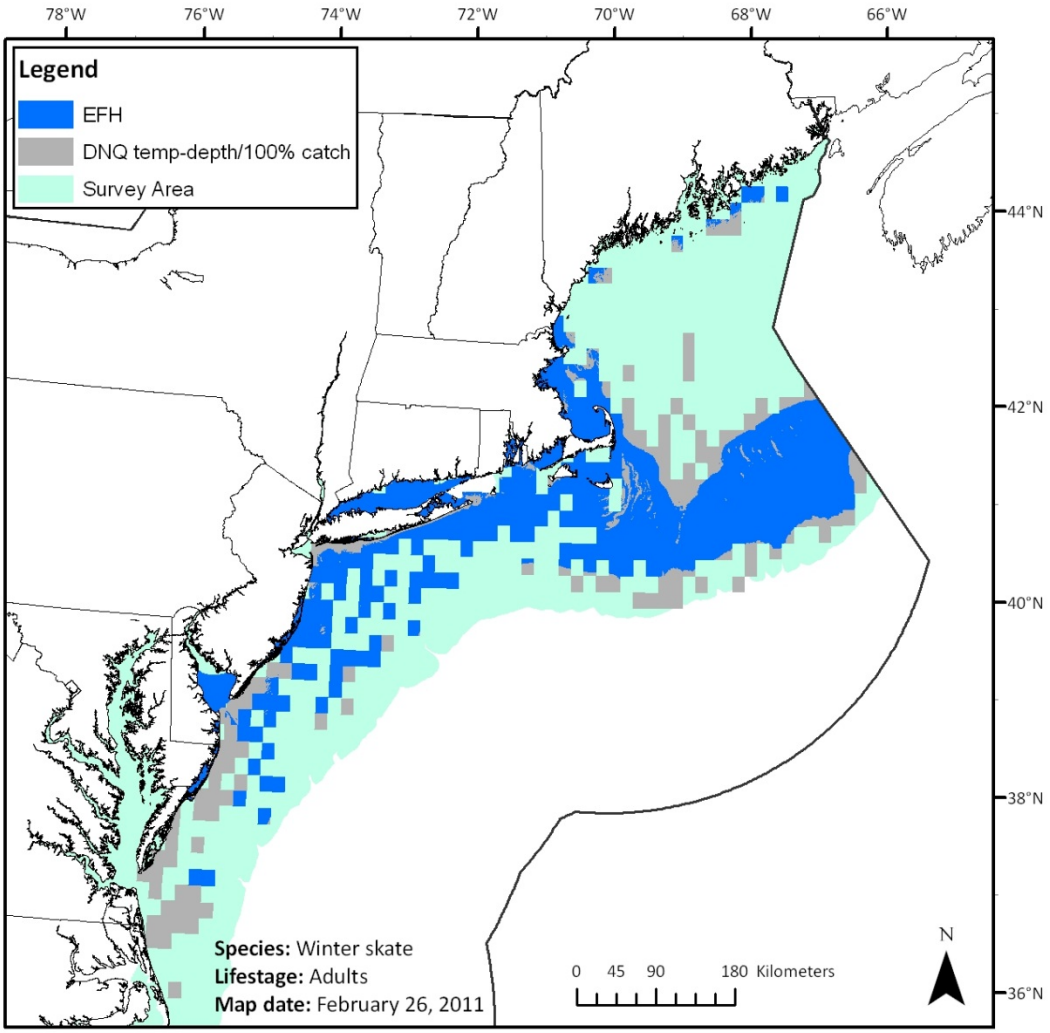
Estuaries and Embayments	Juveniles	Adults
Delaware Inland Bays*	S	S
Maryland Inland Bays*	S	S
Chincoteague Bay	S	S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

Map 52 – Winter skate juvenile EFH.



Map 53 – Winter skate adult EFH.



1.4.6 Rosette skate

As was the case when the original EFH designations for this species were developed, there is no information available on the habitat associations or distribution of the egg stage for this species. Also, there is no larval stage for any of the skates because they emerge from their egg cases as fully developed juveniles. Therefore, there is no proposed EFH designation for either life stage.

Because very few adults are caught in the NMFS bottom trawl survey, the proposed EFH map for juvenile and adult rosette skate is based on the distribution of depths and bottom temperatures that were either associated with high catch rates of juveniles in the 1963-2003 spring and fall NMFS trawl surveys. The map is also based on average catch per tow data for juveniles in ten minute squares of latitude and longitude in the 1968-

2005 spring and fall NMFS trawl surveys at the 75th percentile of catch level. It was referred to as Alternative 3C in the Phase 1 DEIS.

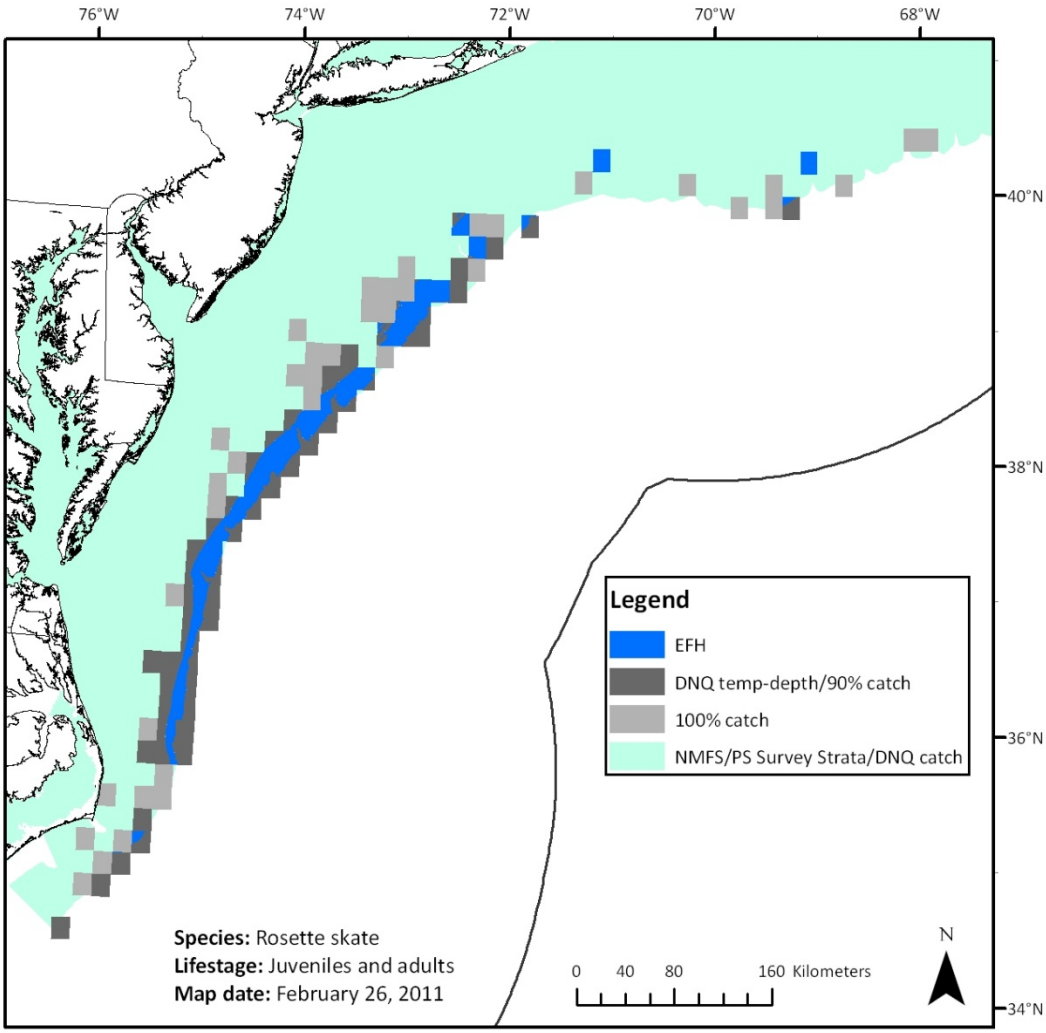
The proposed text description is very similar to the status quo descriptions, which were developed separately, but are identical. The status quo map for juvenile rosette skates includes the same portion of the outer continental shelf (Hudson Canyon to Cape Hatteras) as the proposed juvenile/adult map, from approximately 40˚N to Cape Hatteras.[41] As modified, the proposed designation covers a broader depth range than what was approved in the DEIS (80-400 vs 70-300 meters), but the two maps look the same. The range of this species extends to the Dry Tortugas in Florida in deep water, but in the absence of any survey data upon which to base a map, the EFH designation does not extend south of Cape Hatteras.

Text descriptions:
For rosette skate (*Leucoraja garmani*), essential fish habitat is designated anywhere within the geographic areas that are shown on Map 54 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Juveniles and Adults: Benthic habitats with mud and sand substrates on the outer continental shelf in depths of 80 – 400 meters from approximately 40˚N latitude to Cape Hatteras, North Carolina, as shown on Map 54.

[41] There are two status quo EFH maps, one for juvenile rosette skates and one for adults. There are only seven ten minute squares in the adult map; they are located southeast of Long Island on the outer shelf at the northern end of the juvenile distribution.

Map 54 – Rosette skate juvenile and adult EFH.



1.4.7 Clearnose skate

As was the case when the original EFH designations for this species were developed, there is no information available on the habitat associations or distribution of the egg stage for this species. Also, there is no larval stage for any of the skates because they emerge from their egg cases as fully developed juveniles. Therefore, there is no proposed EFH designation for either life stage.

The proposed EFH maps for juvenile and adult clearnose skate within the NMFS trawl survey area were developed using a GIS depiction of preferred depth and bottom temperature ranges for each life stage that were determined from graphical 1963-2003 spring and fall NMFS trawl survey data in Packer et al. (2003b). The maps are also based on average catch per tow data for juveniles and adults in ten minute squares of

latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75th percentile of catch level, and include inshore areas between New Jersey and Florida where juveniles or adults were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys, four embayments between Raritan Bay and Chesapeake Bay, including Delaware Bay. These juvenile and adult designations were referred to as 3C alternatives in the Phase 1 DEIS.

The proposed new EFH designation for adult clearnose skates extends over the same geographic area as the status quo map – continental shelf waters from Raritan Bay, New Jersey, to Cape Fear, North Carolina.[42] The new maps exclude portions of survey-defined ten minute squares that are deeper than the maximum depths defined in the text descriptions (30 m for juveniles and 40 m for adults) and, therefore, limit EFH to the inner portion of the continental shelf. These maximum depths are much lower than what was included in the status quo descriptions ("most abundant less than 111 meters") and match what is mapped much more explicitly. The other change relative to the status quo designations was the addition of gravel and rocky bottom to the proposed new text descriptions: the original descriptions only defined EFH as occurring on "soft bottom" (interpreted to mean mud and sand).

Four modifications were made to the proposed EFH maps that were approved in the DEIS: 1) the maximum depth for adults was changed from 30 to 40 meters; 2) the mixed salinity zones in the Mid-Atlantic were removed from the adult designation (see salinity data in Appendix B); 3) EFH designations for the juveniles and adults now include fully saline waters in several coastal bays in the Mid-Atlantic that were not designated at all originally, or were only designated for adults; and 4) inshore trawl survey data (SEAMAP survey) collected south of Cape Hatteras were analyzed for the new juvenile map, extending EFH all the way to northern Florida. In addition, intertidal habitat was removed from the approved text descriptions in the DEIS for lack of evidence.

Text descriptions:
For clearnose skate (*Raja eglanteria*), essential fish habitat is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 15 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Juveniles: Sub-tidal benthic habitats in coastal and inner continental shelf waters from New Jersey to the St. Johns River in Florida as shown on Map 55, including the high salinity zones of Chesapeake Bay, Delaware Bay, and the other bays and estuaries listed

[42] The original EFH maps for all the skates do not show the coastal ELMR areas that were included in the designations – they were listed in tables only. Thus, Chesapeake Bay was designated for juvenile and adult clearnose skates, but is not shown on the maps.

in Table 15. EFH for juvenile clearnose skates occurs from the shoreline to 30 meters, primarily on mud and sand, but also on gravelly and rocky bottom.

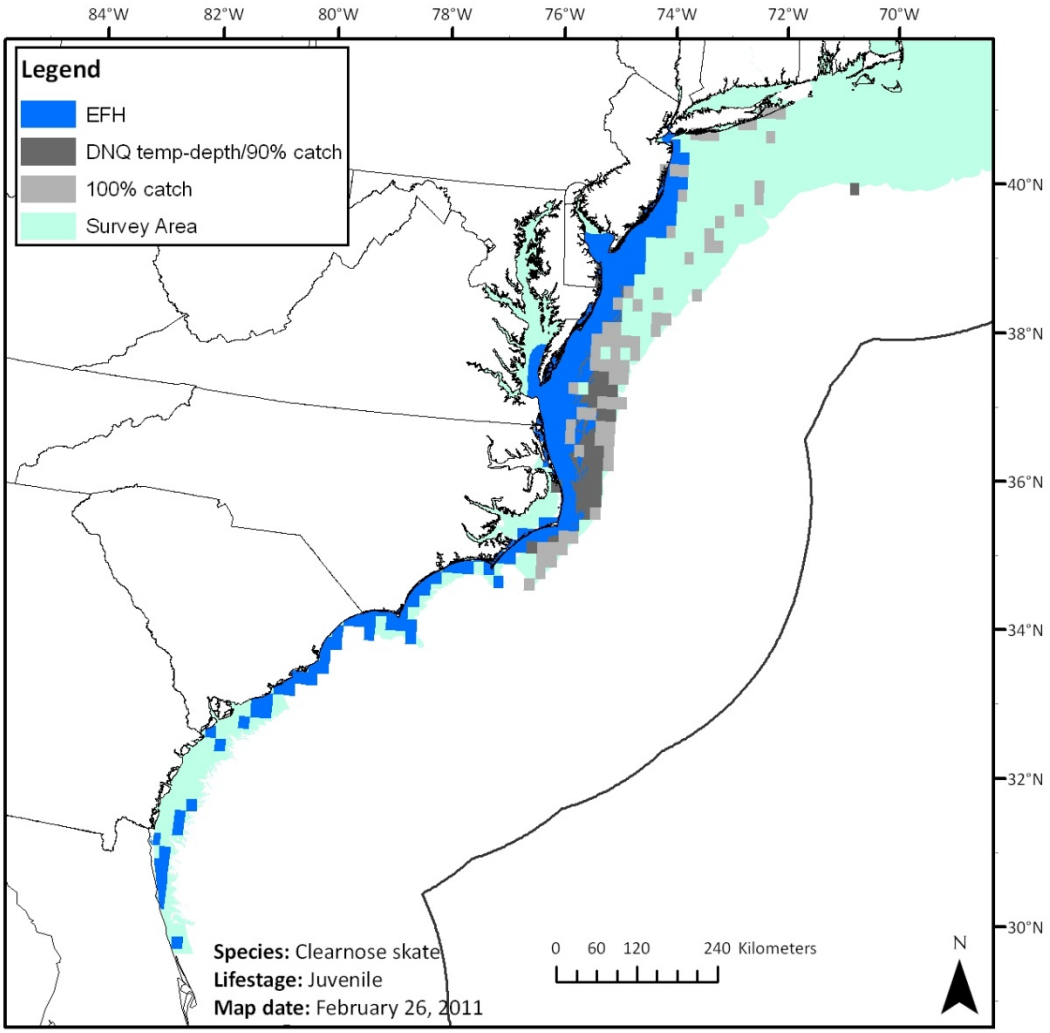
Adults: Sub-tidal benthic habitats in coastal and inner continental shelf waters from New Jersey to Cape Hatteras as shown on Map 56, including the high salinity zones of Chesapeake Bay, Delaware Bay, and the other bays and estuaries listed in Table 15. EFH for adult clearnose skates occurs from the shoreline to 40 meters, primarily on mud and sand, but also on gravelly and rocky bottom.

Table 15 – Clearnose skate EFH designation for estuaries and embayments

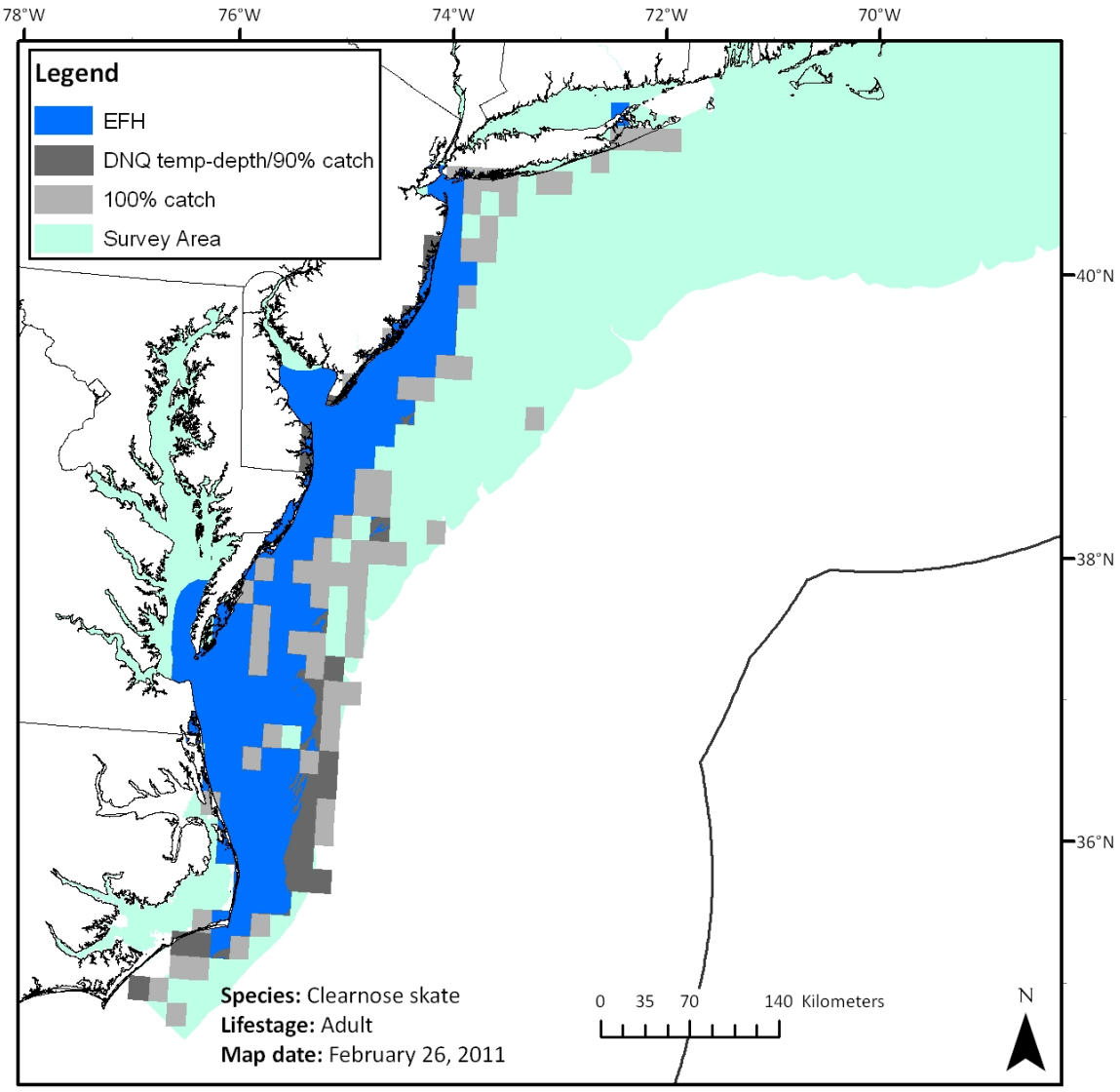
Estuaries and Embayments	Juveniles	Adults
Hudson River / Raritan Bay	S	S
Barnegat Bay	S	S
New Jersey Inland Bays	S	S
Delaware Bay	S	S
Delaware Inland Bays*	S	S
Maryland Inland Bays*	S	S
Chincoteague Bay	S	S
Chesapeake Bay	S	S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

Map 55 – Clearnose skate juvenile EFH.



Map 56 – Clearnose skate adult EFH.



1.5 Other species

1.5.1 Atlantic herring

The proposed Atlantic herring egg EFH designation is represented by ten minute squares within which herring eggs have been observed on the bottom and reported in the literature. These egg bed locations were identified based on a review of all available information on current and historical observations (see Appendix B). In addition, the map includes those bays and estuaries identified in the NOAA ELMR program where herring eggs were reported to be "rare", "common", or "abundant", as well as other ten minute squares that were included in the status quo herring egg EFH designation,

where eggs have never been observed, but where recently-hatched larvae were observed during larval herring surveys. This egg designation was referred to as alternative 2 in the Phase 1 DEIS.

The proposed EFH designation map for Atlantic herring larvae differs slightly from the status quo map. Although no new region-wide survey data have been collected since the MARMAP egg and larval surveys were conducted in 1977-1987, any ten minute squares that were "filled in" in the original maps have been removed (see explanation of the status quo mapping methodology in Appendix A). Just like the no action/status quo EFH map, the proposed map is based on the 90th percentile of the observed range of the MARMAP larval survey data using the original data transformation (see Appendix A for an explanation of the difference between maps based on "range" or "area" and maps based on "catch"). This designation also includes those bays and estuaries identified by the NOAA ELMR program as supporting Atlantic herring larvae at a "common" or "abundant" level.

The proposed EFH designations for juvenile and adult Atlantic herring are based upon average catch per tow at the 75th percentile of area level in ten minute squares of latitude and longitude in the 1968-2005 fall and spring NMFS trawl survey data, plus several squares that either were not surveyed, or that the Council's Habitat Committee determined were not well represented in the survey data.[43] The proposed new EFH maps also include ten minute squares in inshore areas where juvenile or adult Atlantic herring were caught in state trawl surveys in more than 10% of the tows, as well as those bays and estuaries identified by the NOAA ELMR program where they were "common" or "abundant." A few more ten minute squares on the coasts of Maine, Connecticut, and Rhode Island that were either unsurveyed (fewer than four tows) or identified by fishing industry members of the Habitat Committee were also added to both maps. These designations were referred to as 2E alternatives in the Phase 1 DEIS.

The proposed EFH designation (text and maps) for Atlantic herring eggs is almost identical to the status quo designation: a few ten minute squares were added in the Gulf of Maine and the depth range was slightly expanded from 20-80 meters to 5-90 meters.[44] The proposed EFH maps for juveniles and adults extend over the same geographic area as the status quo maps, but include more ten minute squares. The most significant changes are in the proposed EFH descriptions, both of which define a much broader depth range (0 to 300 m and, for the juveniles, include the intertidal zone). Also, the

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[43] Because Atlantic herring are pelagic, like eggs and larvae of other managed species, this is the only species for which percent area instead of percent catch was used to map EFH for juveniles and adults (see explanation in Appendix A).

[44] As with all the proposed EFH text descriptions, the depth ranges are now a required component of the EFH designation and are no longer "generally" applicable.

juvenile EFH description includes some temperature and salinity information specific to young-of-the-year juveniles.

Text descriptions:
Essential fish habitat for Atlantic herring (Clupea harengus) is designated anywhere within the geographic areas that are listed in Table 16 and the following maps which exhibit the environmental conditions defined in the text descriptions. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Inshore and continental shelf benthic habitats in the Gulf of Maine and on Georges Bank and Nantucket Shoals in depths of 5 – 90 meters (see Map 57) on boulders, cobble/pebble, gravel, coarse sand, and/or macroalgae,. Eggs adhere to the bottom, often in areas with strong bottom currents, forming egg "beds" that may be many layers deep.

Larvae: Inshore and continental shelf pelagic habitats in the Gulf of Maine, on Georges Bank, and in the upper Mid-Atlantic Bight, as shown on Map 58Map 58, and in the bays and estuaries listed in Table 16.

Juveniles: Intertidal and sub-tidal pelagic habitats from the shoreline (MHW) to 300 meters throughout the Northeast region, as shown on Map 59, including the bays and estuaries listed in Table 16. Young-of-the-year juveniles can survive winter temperatures as low as -1.1ºC and salinities as low as 5 ppt (see Appendix B).

Adults: Sub-tidal pelagic habitats with maximum depths of 300 meters throughout the Northeast region, as shown on Map 60, including the bays and estuaries listed in Table 16. Spawning takes place on the bottom, generally in depths of 5 – 90 meters on a variety of substrates (see eggs).

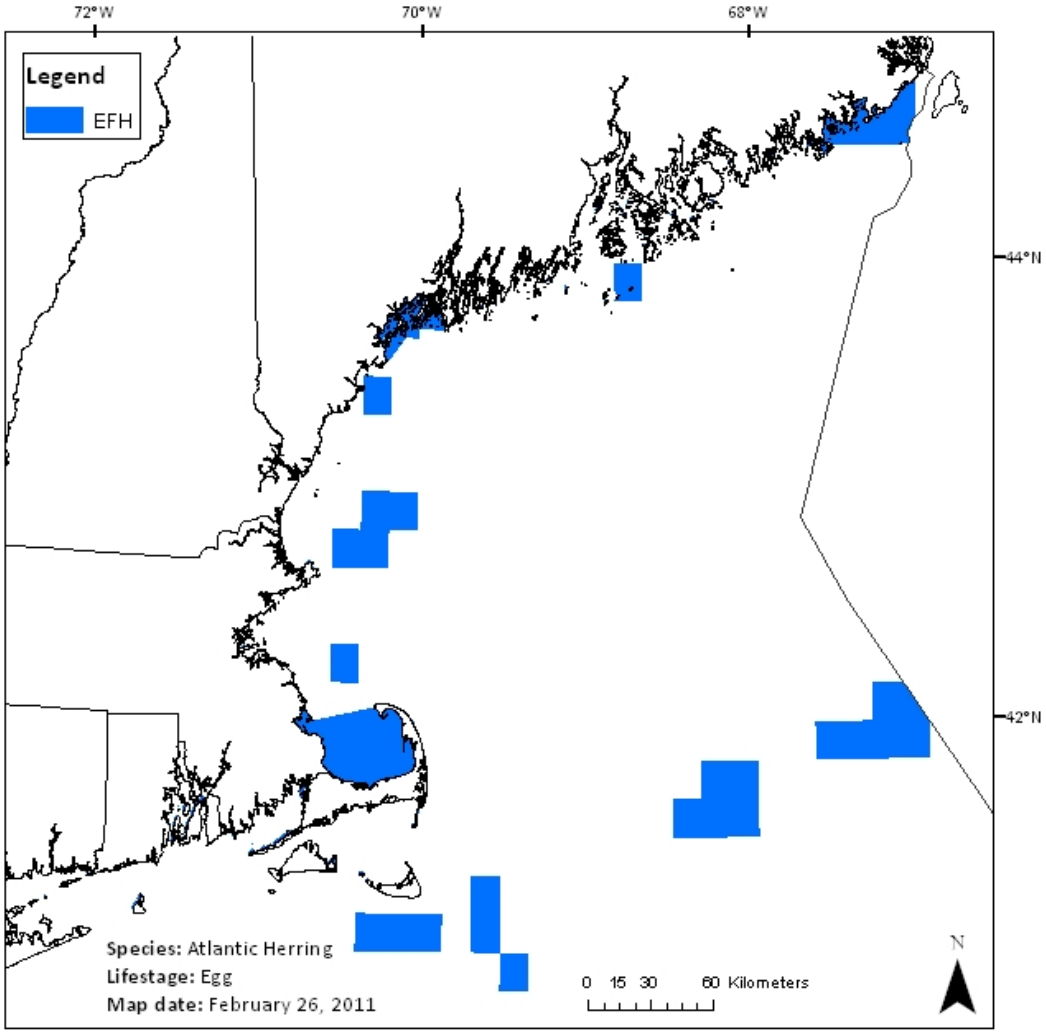
Table 16 – Atlantic herring EFH designation for estuaries and embayments.

Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Passamaquoddy Bay		S,M	S,M	S,M
Englishman/Machias Bay	S	S,M	S,M	S,M
Narraguagus Bay		S,M	S,M	S,M
Blue Hill Bay		S,M	S,M	S,M
Penobscot Bay		S,M	S,M	S,M
Muscongus Bay		S,M	S,M	S,M
Damariscotta River		S,M	S,M	S,M
Sheepscot River		S,M	S,M	S,M
Kennebec / Androscoggin		S,M	S,M	S,M
Casco Bay	S	S,M	S,M	S

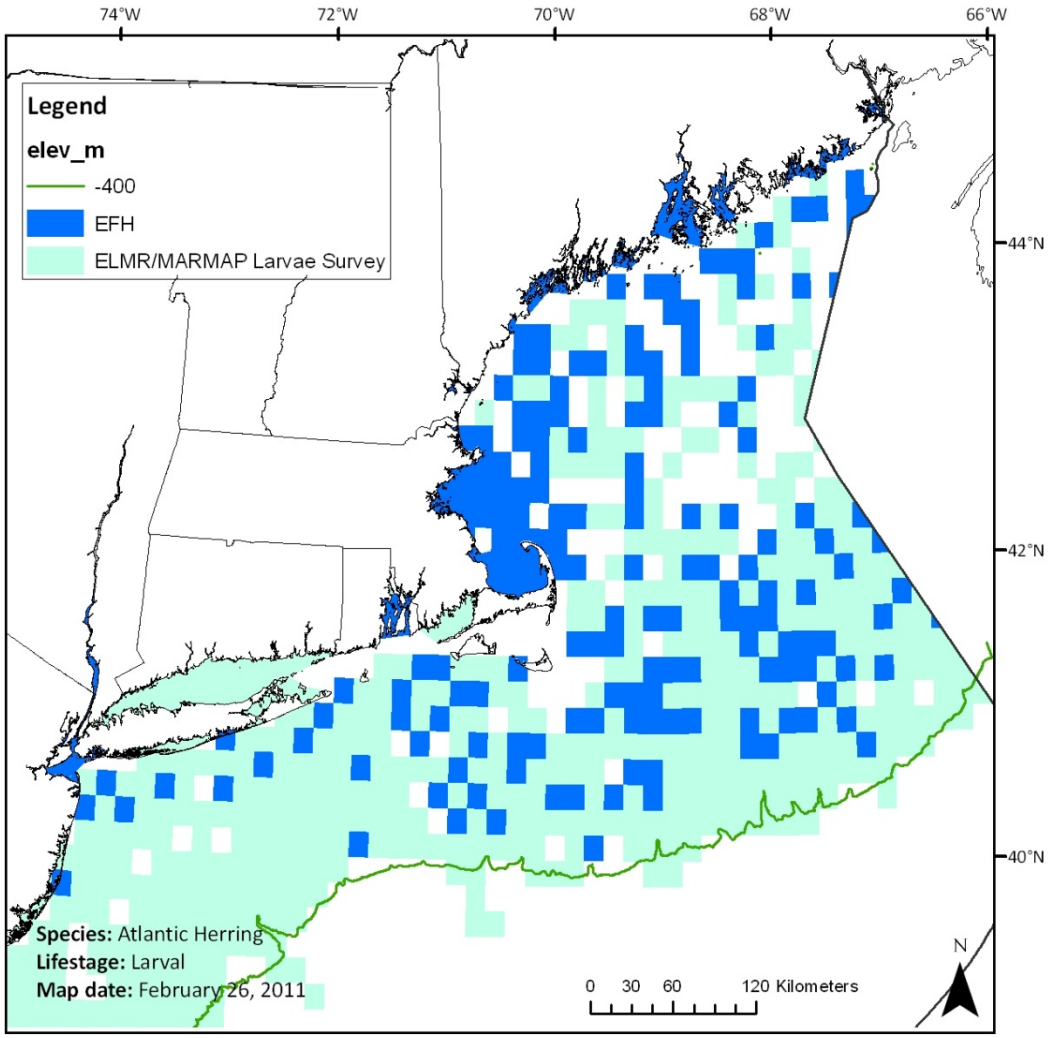
Estuaries and Embayments	Eggs	Larvae	Juveniles	Adults
Saco Bay		S,M	S,M	S
Wells Harbor		S,M	S,M	S
Great Bay		S,M	S,M	S
Hampton Harbor*		S,M	S,M	S
Merrimack River		M	M	
Plum Island Sound*		S,M	S,M	S
Massachusetts Bay		S	S	S
Boston Harbor		S	S,M	S,M
Cape Cod Bay	S	S	S	S
Buzzards Bay			S,M	S,M
Narragansett Bay		S	S,M	S,M
Long Island Sound			S,M	S,M
Gardiners Bay			S	S
Great South Bay			S	S
Hudson River / Raritan Bay		S,M	S,M	S,M
Barnegat Bay			S,M	S,M
New Jersey Inland Bays			S,M	S,M
Delaware Bay			S,M	S
Chesapeake Bay				S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).
** = This water body was not included in the original ELMR reports, but it was included in the salinity zone maps that were appended to all the relevant fishery management plans and amendments which implemented the status quo EFH designations; EFH designations were inferred in these locations if there were ELMR-based designations in the adjacent north and south locations.*

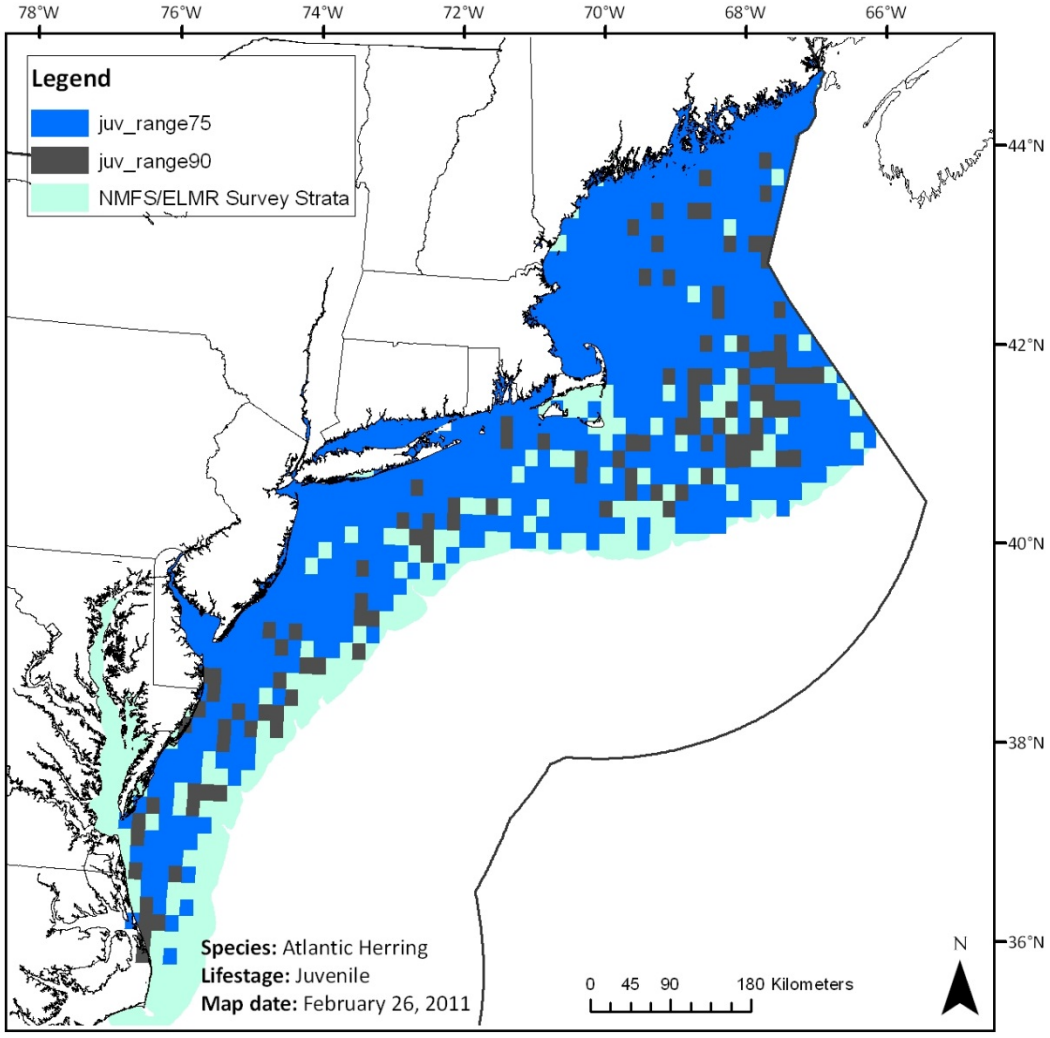
Map 57 – Atlantic herring egg EFH.



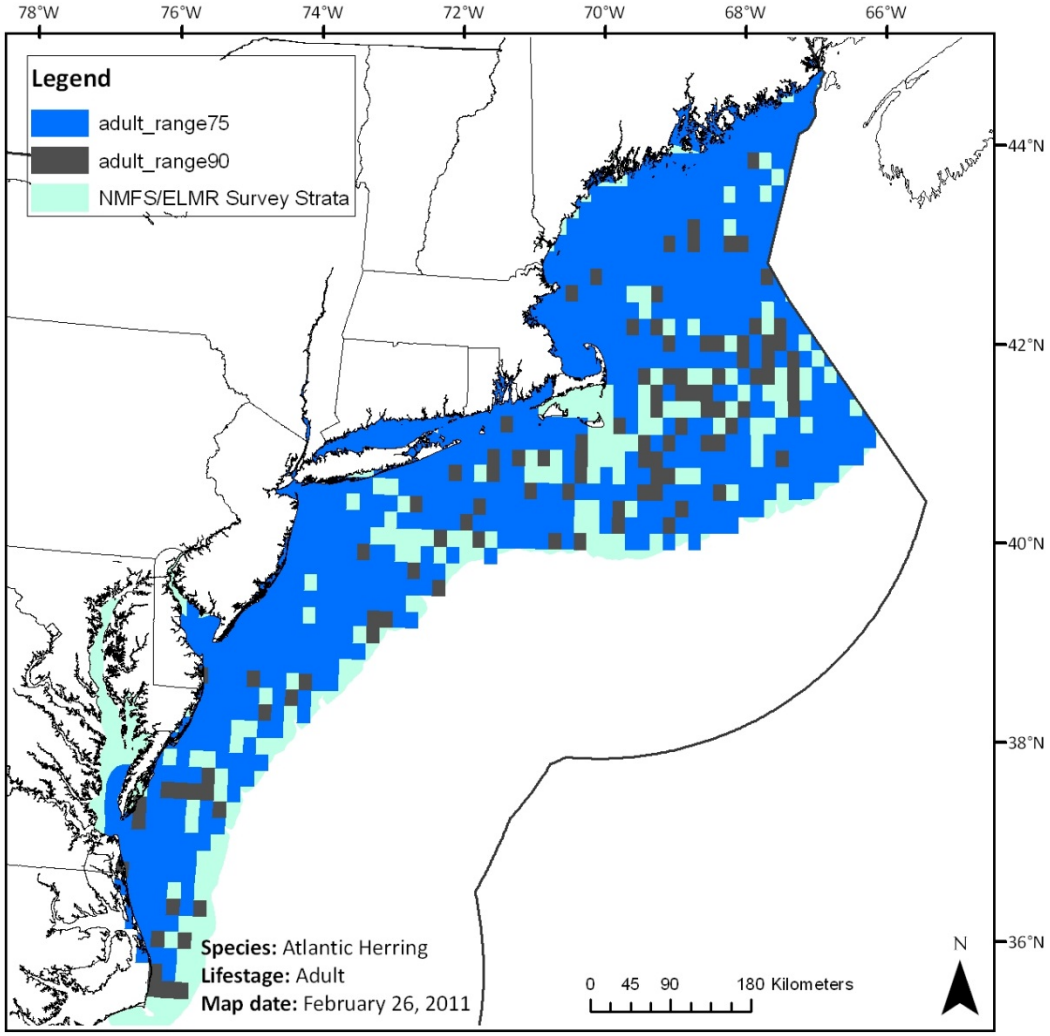
Map 58 – Atlantic herring larval EFH.



Map 59 – Atlantic herring juvenile EFH.



Map 60 – Atlantic herring adult EFH.



1.5.2 Atlantic salmon

The proposed EFH designation for Atlantic salmon includes the rivers, estuaries, and bays that are listed in Table 17 and shown in Map 61 which exhibit the environmental conditions defined in the text descriptions. There are two proposed text descriptions, one for fresh water spawning and rearing habitats and one for habitats used during migrations to and from the ocean, each with up-dated information specific to certain life history stages. Under the proposed alternative, smaller tributaries not shown on the map would also be EFH for one or more life stage as long as they conform to the proposed habitat descriptions. All river systems proposed for designation form a direct connection to the sea, but EFH would not include portions of rivers above naturally occurring barriers to upstream migration or land-locked lakes and ponds. The oceanic component of EFH would be limited to a distance of three miles from the mouth of each

river. The proposed EFH designation includes all rivers and streams where the presence of returning adult salmon was documented in at least one year between 1996 and 2005 (see Appendix A for more details). The index numbers for each river used in and Map 61 correspond to subregion names and hydrologic unit codes (HUC) used by the U.S. Geological Survey.

The proposed designation includes nine new drainage systems not included in the original list of 26 rivers. Six are in the Maine coastal subregion (Chandler, Indian, Pleasant, St. George, Medomak, and Pemaquid rivers), and three in the Saco River subregion (Royal, Kennebunk and Mousam rivers). All told, there are 33 river systems in nine New England subregions being proposed for Atlantic salmon EFH. The status quo EFH maps included a number of discrete coastal ten minute squares, whereas the proposed map includes a more continuous series of bays and areas adjacent to river mouths that are within three miles of the coast. Designated EFH in Long Island Sound has been reduced to small areas where the Connecticut and Pawcatuck Rivers empty into the sound, rather than taking up the entire sound. Also, a number of improvements are proposed for the text descriptions which would make the habitat requirements for each life stage more specific and applicable to three separate juvenile life stages (fry, parr, and smolts).

Text descriptions:
Essential fish habitat for Atlantic salmon (*Salmo salar*) is designated as the rivers, estuaries, and bays that are listed in Table 17 and shown in Map 61. Supplementary habitat-related information, including prey, for each life stage is summarized in Appendix B. The designated rivers and streams form a direct connection to the sea. EFH for the freshwater life history stages of Atlantic salmon includes all rivers, streams, lakes, and ponds in each designated drainage system that exhibit the environmental conditions identified in the following EFH text descriptions. Smaller order tributaries that could be designated as EFH are not shown in the map.

Fresh Water Spawning and Rearing Habitats - Riffle and run habitats in shallow, well-oxygenated, fresh water streams with gravel/rocky substrates, as well as pools and vegetated riverine areas of lower velocity. These habitats occur in a range from 1st order streams (headwaters) to some 3rd or 4th order streams with low temperatures within the watersheds of the rivers listed in Table 17 and shown in Map 61. Five life stages of Atlantic salmon utilize these habitats – eggs, larvae (alevins), recently-hatched juveniles (fry), older juveniles (parr), and spawning adults. Intra-gravel habitat in the stream bed is essential for Atlantic salmon eggs and alevins, whereas EFH for the juveniles and spawning adults is the stream itself. Only parr utilize non-riffle and run habitats. The following conditions generally apply where EFH for these five life stages is found.

Eggs: Grain size diameters of 2-64 mm, water depths of 17-76 cm, water temperatures of 0-16°C (6-7 optimal), intra-gravel water velocities above 20 cm/sec (53 optimal),

dissolved oxygen concentrations above 3 mg/l (7 optimal), and ph above 4.0 (5.5 optimal). Eggs are deposited in nests (redds) in late October-November and are buried in the substrate to depths of 10-25 cm where they remain for 175-195 days before hatching.

Larvae: Grain size diameters of 2-64 mm, water depths of 17-76 cm, water temperatures of 0-16°C, intra-gravel water velocities above 20 cm/sec (53 optimal), and dissolved oxygen concentrations above 3 mg/l (7 optimal). Larvae remain in the substrate for about six weeks before emerging as fry in the spring.

Juveniles (fry, <5 cm TL): Grain size diameters of 15-64 mm and, for emerging fry, stream flow velocities below 20 cm/sec. EFH conditions of depth and temperature for small, emerging fry are generally the same as for eggs and larvae, but larger fry disperse up to 5 km from redd sites and may be exposed to a wider range of habitat conditions.

Juveniles (parr, 5-10 cm TL): Water depths of 10-15 cm for parr <7 cm TL and 30-60 cm for larger parr, temperatures of 7-25°C, dissolved oxygen concentrations above 5 mg/l, and water velocities of 30-92 cm/sec.

Spawning adults: Grain size diameters of 2-64 mm, water depths of 17-76 cm, and temperatures of 4-14°C. Spawning in U.S. waters generally occurs during late October through November. EFH for spawning adult salmon also includes coastal marine, estuarine, lacustrine, and riverine habitats used during upstream migration (see below).[45]

Emigration-Immigration Habitats – A variety of riverine, lacustrine, estuarine, and coastal marine habitats used by older juvenile Atlantic salmon (smolts, >10 cm TL) during their downstream migration to the sea, by mature adult salmon during their upstream spawning migration, and by spent adults (kelts) following spawning, before they return to the ocean. EFH for migrating smolts and kelts includes streams, rivers, and estuaries from 1st to 5th order, as well as lakes, ponds, and impoundments, within the watersheds of the rivers listed in Table 17 and shown in Map 61. EFH for all three life stages is generally characterized by salinities below 25 ppt. Transit habitats utilized during upstream migration include streams, rivers, and estuaries from 1st to 5th order, as well as coastal marine areas adjacent to the mouths of designated rivers and estuaries within state waters (3 miles).

[45] All spawning females are sea-run salmon, but spawning males include some sea-run salmon and some juveniles that mature in fresh water before ever migrating to the ocean.

Table 17 –New England rivers, streams, and estuaries (bays) designated as EFH for Atlantic salmon, based on documented presence of juveniles or adults.

Locations labeled as "recent" have had a documented presence in the last 10 years (1996-2005) and those labeled as "current" have had a documented presence in the last three (3) years (2003-2005).

Subregion (HUC4)	HUC	Drainage	River Status	Bay Designation	Estuary Status	River Name	Index
St John	0101	St John	Current	Bay of Fundy[a]	Current	Aroostook River	1
						Little Madawaska River	2
						Big Machias River	3
						Mooseleuk Stream	4
						Presque Isle Stream	5
						St Croix Stream	6
						Meduxnekeag River	7
						N Branch Meduxnekeag R	8
Maine Coastal	0105	St Croix	Current	Passamaquoddy[a] Bay	Current	St Croix River	9
						Tomah Stream	10
		Boyden	Recent	Cobscook Bay	Current	Boyden Stream	11
		Dennys	Current			Dennys River	13
						Cathance Stream	14
		Hobart	Recent			Hobart Stream	15
		East Machias	Current	Machias Bay	Current	East Machias River	17
		Machias	Current			Machias River	18
						Mopang Stream	19
						Old Stream	20
		Chandler	Recent	Chandler/ Englishman Bay	Recent	Chandler River	21
		Indian	Recent	Western Bay	Recent	Indian River	22
		Pleasant	Current	Pleasant/ Narraguagus Bay	Current	Pleasant River	23
		Narraguagus	Current			Narraguagus River	24
						West Branch Narraguagus R	25
		Tunk	Recent	Gouldsboro Bay	Recent	Tunk Stream	26

Subregion (HUC4)	HUC	Drainage	River Status	Bay Designation	Estuary Status	River Name	Index
		Union	Current	Blue Hill Bay	Current	Union River	27
						West Branch Union R	28
Penobscot	0102	Orland	Recent	Penobscot Bay	Current	Orland River	29
		Penobscot	Current			Penobscot River	30
						Cove Brook	31
						East Branch Mattawamkeag River	32
						East Branch Penobscot R	33
						East Branch Pleasant R	34
						Eaton Brook	35
						Felts Brook	36
						Kenduskeag Stream	37
						Marsh Stream	38
						Mattawamkeag River	39
						Millinocket Stream	40
						Molunkus Stream	41
						Nesowadnehunk Stream	42
						North Branch Marsh Stream	43
						North Branch Penobscot R	44
						Passadumkeag River	45
						Pine Stream	46
						Piscataquis River	47
						Pleasant River	48
						Russell Stream	49
						Salmon Stream	50
						Seboeis River	51
						Souadabscook Stream	52

Subregion (HUC4)	HUC	Drainage	River Status	Bay Designation	Estuary Status	River Name	Index
						South Branch Penobscot R	53
						Sunkhaze Stream	54
						Wassataquoik Stream	55
						West Branch Mattawamkeag R	56
						West Branch Penobscot R	57
						West Branch Pleasant R	58
						West Branch Souadabscook Stream	59
Maine Coastal	0105	Passagassawakeag	Current			Passagassawakeag River	60
		Ducktrap	Current			Ducktrap River	62
		St George	Current	Muscongus Bay	Current	St George River	63
		Medomak	Recent			Medomack River	64
		Pemaquid	Recent	Johns Bay	Recent	Pemaquid River	65
		Sheepscot	Current	Sheepscot Bay	Current	Sheepscot River	66
						West Branch Sheepscot R	67
Kennebec	0103	Kennebec	Current	Local Estuary	Current	Kennebec River	68
						Carrabassett River	69
						Carrabassett Stream	70
						Craigin Brook	71
						Eastern River	72
						Messalonskee Stream	73
						Sandy River	74
						Sebasticook River	75
						Togus Stream	76
						Wesserunsett Stream	77

Subregion (HUC4)	HUC	Drainage	River Status	Bay Designation	Estuary Status	River Name	Index
Androscoggin	0104	Androscoggin	Current	Local Estuary	Current	Androscoggin River	78
						Little Androscoggin River	79
						Nezinscot River	80
						Webb River	81
Saco	0106	Royal River	Recent	Casco Bay	Recent	Royal River	82
		Presumpscot	Recent			Presumpscot River	83
						Mill Brook	84
						Piscataqua River	85
Saco	0106	Saco	Current	Saco Bay	Current	Saco River	86
						Breakneck Brook	87
						Ellis River	88
						Hancock Brook	89
						Josies Brook	90
						Little Ossipee River	91
						Ossipee River	92
						Shepards River	93
						Swan Pond Brook	94
		Kennebunk	Recent	Local Estuary	Recent	Kennebunk River	95
		Mousam	Recent			Mousam River	96
		Cocheco	Current	Great Bay	Current	Cocheco River	97
		Lamprey	Current			Lamprey River	98
Merrimack	0107	Merrimack	Current	Ipswich Bay	Current	Merrimack River	99
						Amey Brook	100
						Assabet River	101
						Baboosic Brook	102
						Baker River	103
						Beaver Brook	104
						Blackwater River	105
						Bog Brook	106
						Cockermouth River	107

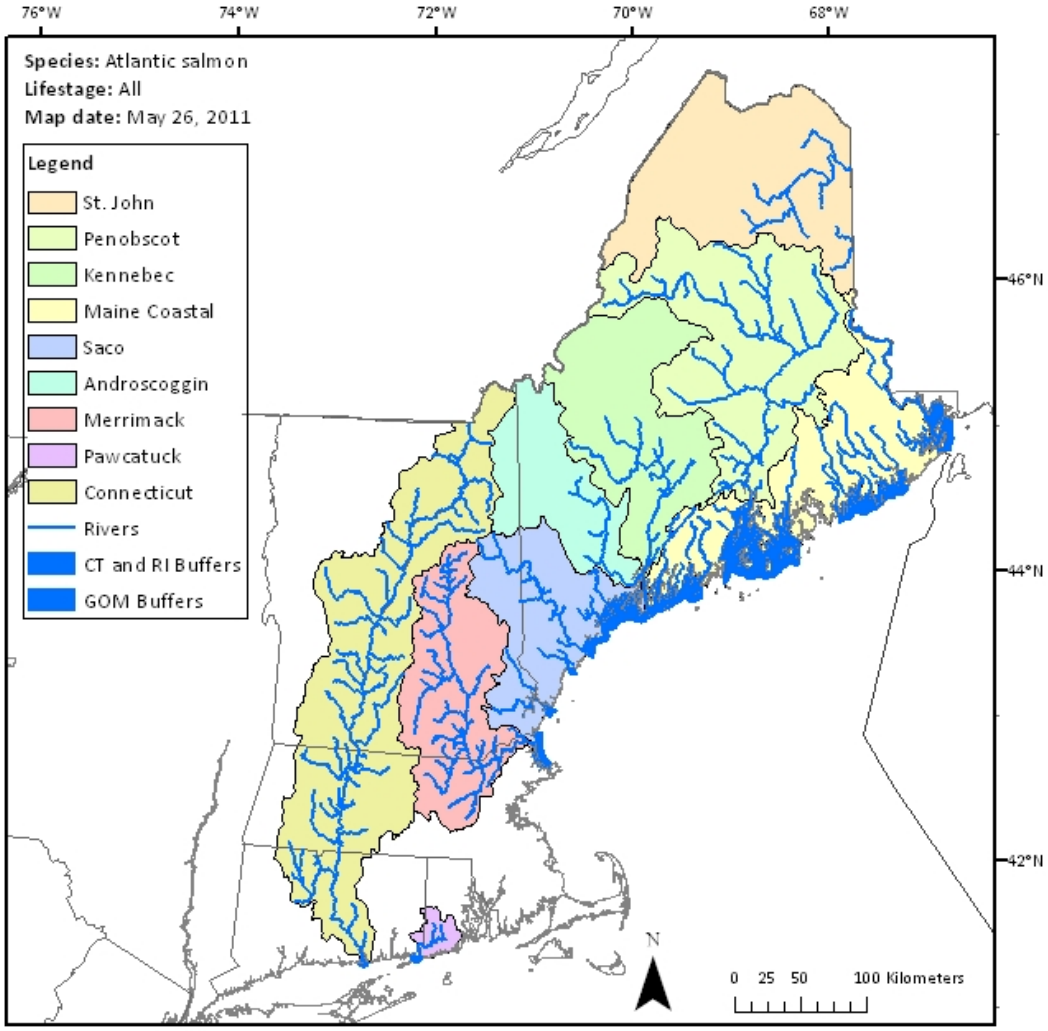
Subregion (HUC4)	HUC	Drainage	River Status	Bay Designation	Estuary Status	River Name	Index
						Cohas Brook	108
						Concord River	109
						Contoocook River	110
						E Branch Pemigewasset R	111
						Eastman Brook	112
						Glover Brook	113
						Golden Brook	197
						Hubbard Brook	114
						Mad River	116
						Mill Brook	117
						Moosilauke Brook	118
						Nashua River	119
						Nissitissit River	120
						Pemigewasset River	121
						Pennichuck Brook	122
						Piscataquog River	123
						Powwow River	124
						Pulpit Brook	125
						Shawseen River	126
						Smith River	127
						Souhegan River	128
						South Branch Baker River	198
						S Branch Piscataquog R	129
						Spicket River	130
						Squannacook River	131
						Stony Brook	132
						Sudbury River	133
						Suncook River	134
						Warner River	135

Subregion (HUC4)	HUC	Drainage	River Status	Bay Designation	Estuary Status	River Name	Index
						West Branch Brook	136
						Witches Brook	199
MA-RI Coastal	0109	Pawcatuck	Current	Long Island Sound	Current	Pawcatuck River	139
						Beaver River	140
						Wood River	141
Connecticut	0108	Connecticut	Current	Long Island Sound	Current	Connecticut River	145
						Ammonoosuc River	146
						Ashuelot River	147
						Black River	148
						Blackledge River	149
						Bloods Brook	150
						Chicopee River	151
						Cold River	152
						Deerfield River	153
						East Branch Farmington R	154
						East Branch Salmon Brook	155
						Eight Mile River	156
						Fall River	157
						Farmington River	158
						Fort River	159
						Four Mile Brook	160
						Green River	161
						Israel River	162
						Johns River	163
						Little Sugar River	164
						Manhan River	165
						Mascoma River	166
						Mill Brook	167
						Mill River (Hatfield)	168
						Mill River	169

Subregion (HUC4)	HUC	Drainage	River Status	Bay Designation	Estuary Status	River Name	Index
						(Northampton)	
						Millers River	170
						Mohawk River	171
						Nepaug River	172
						Nulhegan River	173
						Ompompanoosuc River	174
						Ottauquechee River	175
						Passumpsic River	176
						Paul Stream	177
						Pequabuck River	178
						Salmon Brook	179
						Salmon River	180
						Sawmill River	181
						Saxtons River	182
						Stevens River	183
						Sugar River	184
						Upper Ammonoosuc River	185
						Waits River	186
						Wells River	187
						West Branch Farmington R	188
						West River	189
						Westfield River	190
						White River	191
						Williams River	192

[a] EFH does not include Canadian waters in the Bay of Fundy or Passamaquoddy Bay

Map 61 – Atlantic salmon EFH, all lifestages.



1.5.3 Atlantic sea scallops

The EFH map for all life stages of Atlantic sea scallops includes: (1) all the ten minute squares where juveniles or adults were caught during 1982-2005 in the summer NMFS sea scallop dredge survey, (2) ten minute squares in the Gulf of Maine where juveniles or adults were caught in state trawl surveys in more than 10% of the tows, and (3) those bays and estuaries identified by the NOAA ELMR program where juvenile or adult Atlantic sea scallops were "common" or "abundant." Additional ten minute squares on Fipennies Ledge (central Gulf of Maine) and in eastern Maine that are not well represented in state surveys of the Gulf of Maine were filled in on the map. This designation (entire range plus additional ten minute squares) was referred to as alternative 5 in the Phase 1 DEIS.

This is a description of the map that was approved in 2007; a new description is needed if the new alternative is approved.

Text descriptions:
Essential fish habitat for Atlantic sea scallops (*Placopecten magellanicus*) is designated anywhere within the geographic areas that are shown on Map 62 and listed in Table 17 which exhibit the environmental conditions defined in the following text descriptions. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Benthic habitats in inshore areas and on the continental shelf as shown on Map 62. Eggs are heavier than seawater and remain on the seafloor until they develop into the first free-swimming larval stage.

Larvae: Benthic and water column habitats in inshore areas and on the continental shelf [where?] as shown on Map 62. As pelagic larvae settle to the bottom (as "spat"), they attach to a variety of hard surfaces, including shells, pebbles, and gravel, and to macroalgae and other benthic organisms such as hydroids. Spat attached to sedentary branching organisms or any hard surface have greater survival rates; spat that settle on shifting sand do not survive.

Juveniles: Inshore and continental shelf benthic habitats [where?] in depths of 18 - 110 meters with substrates of sand, gravel, and/or mixtures of gravel, mud, and sand, as shown on Map 62. Small juveniles (spat) attached to sedentary branching organisms or any hard surface have greater survival rates; spat that settle on shifting sand do not survive

Adults: Inshore and continental shelf benthic habitats [where?] in depths of 18 - 110 meters as shown on Map 62. Adult sea scallops are found on firm sand, gravel, shells, and rocks, and are most abundant on gravel. Strong tidal currents (>25 cm/sec) inhibit feeding.

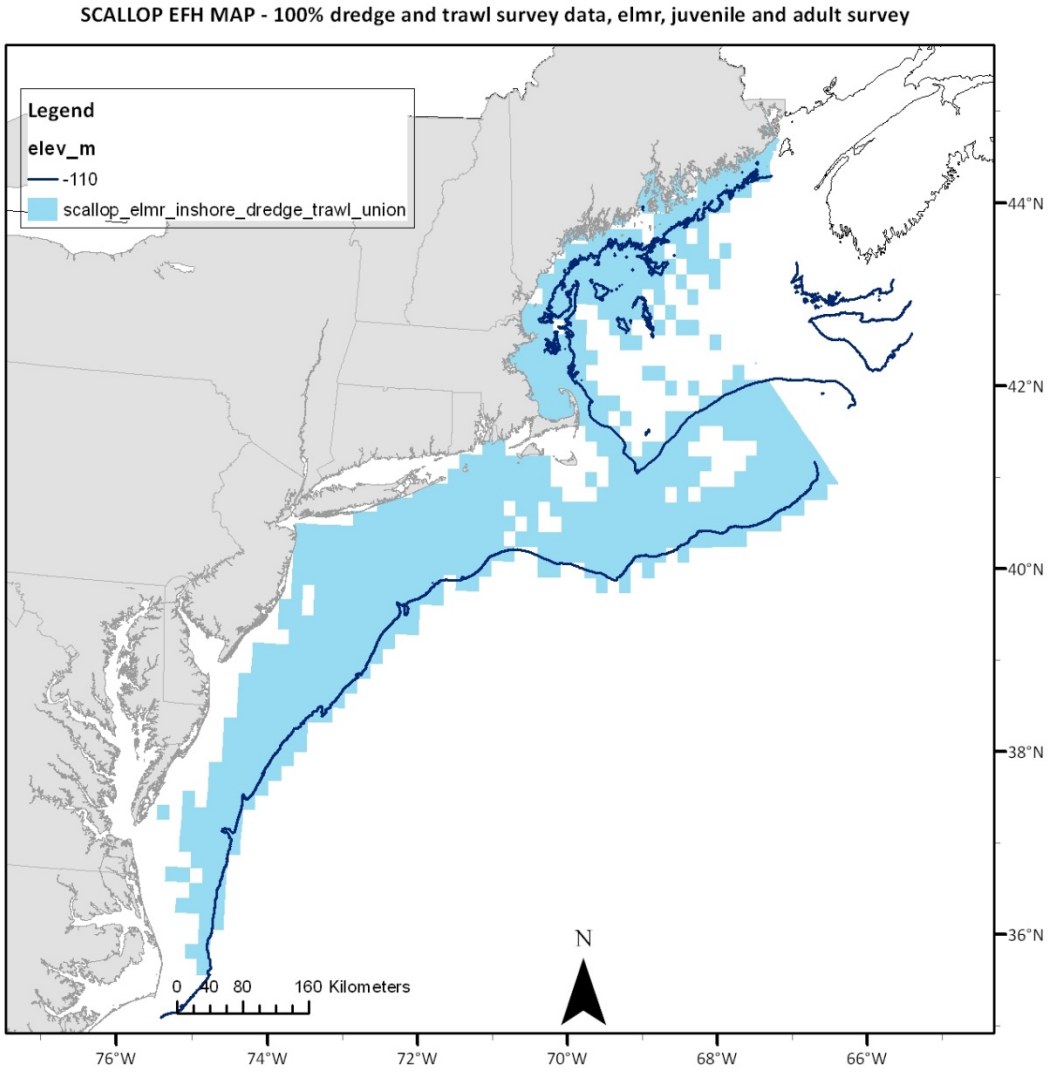
Table 18 – Atlantic sea scallop EFH designation for estuaries and embayments

Estuaries and Embayments	All life stages
Passamaquoddy Bay	S
Englishman/Machias Bay	S
Narraguagus Bay	S
Blue Hill Bay	S
Penobscot Bay	S
Muscongus Bay	S

Estuaries and Embayments	All life stages
Damariscotta River	S
Sheepscot River	S
Casco Bay	S
Great Bay	S
Massachusetts Bay	S
Cape Cod Bay	S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

Map 62 – Atlantic sea scallop EFH.



1.5.4 Deep-sea red crab

The proposed EFH designations for deep-sea red crab are based on a re-evaluation of published size and sex-specific data collected during a 1974 NMFS deep-water trawl survey that were also used in 2002 to develop the original designations, and on new observations of red crabs on two seamounts (see Appendix B and Table A-10). As was done for the status quo designations, the proposed EFH egg designation is based on the depth range where catches of female crabs were higher, larval EFH extends over the depth range where the juveniles and adults were most commonly caught, juvenile EFH corresponds to the depth range where juveniles were most common, and adult EFH to a more restricted depth range where adults were most common. The proposed designations for larvae, juveniles, and adults also include the portions of two seamounts that are above the maximum depth where red crabs have been observed in remotely-operated underwater vehicle surveys. The proposed designations employs level 2 information for the slope, and level 1 information for the seamounts. Red crabs also inhabit the Gulf of Maine, but it was not included in the proposed designations because there was no level 2 information available to indicate any depth preferences. The proposed egg designation was referred to as alternative 2 in the Phase 1 DEIS[46] and the designations for larvae, juveniles, and adults as alternative 3A.

The depth range in the proposed EFH designation for adult red crabs is more restricted than the status quo designation and starts in slightly deeper water (320-900 m versus 200-1300 m), which would have the effect of shifting EFH more completely off the shelf and into the continental slope. The proposed EFH for juvenile red crabs would extend over a wider depth range than EFH for the adults (about 1000 vs 600 m) and, compared to the status quo designation, start and end in shallower water (320-1300 vs 700-1800 m). The proposed EFH for red crab eggs is also slightly different (320-640 m) than the status quo designation (200-400 m). The addition of portions of two seamounts (mostly on Bear Seamount) would mark the first time that EFH has been designated on any seamount in the U.S. EEZ.[47]

Text descriptions:

Essential fish habitat for red crab (*Chaceon quinquedens*) is designated anywhere within the geographic areas that are shown on the following maps which exhibit the environmental conditions defined in the text descriptions. Additional habitat-related information for this species can be found in Appendix B.

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[46] Note that the Habitat Committee approved the No Action alternative during Phase 1 because no new information relating to the depth distribution of female red crabs on the continental slope was available, but Alternative 2 should have been selected because the depth range was revised based on a re-analysis of the 1974 survey data.

[47] Red crabs are the only species with EFH on the seamounts

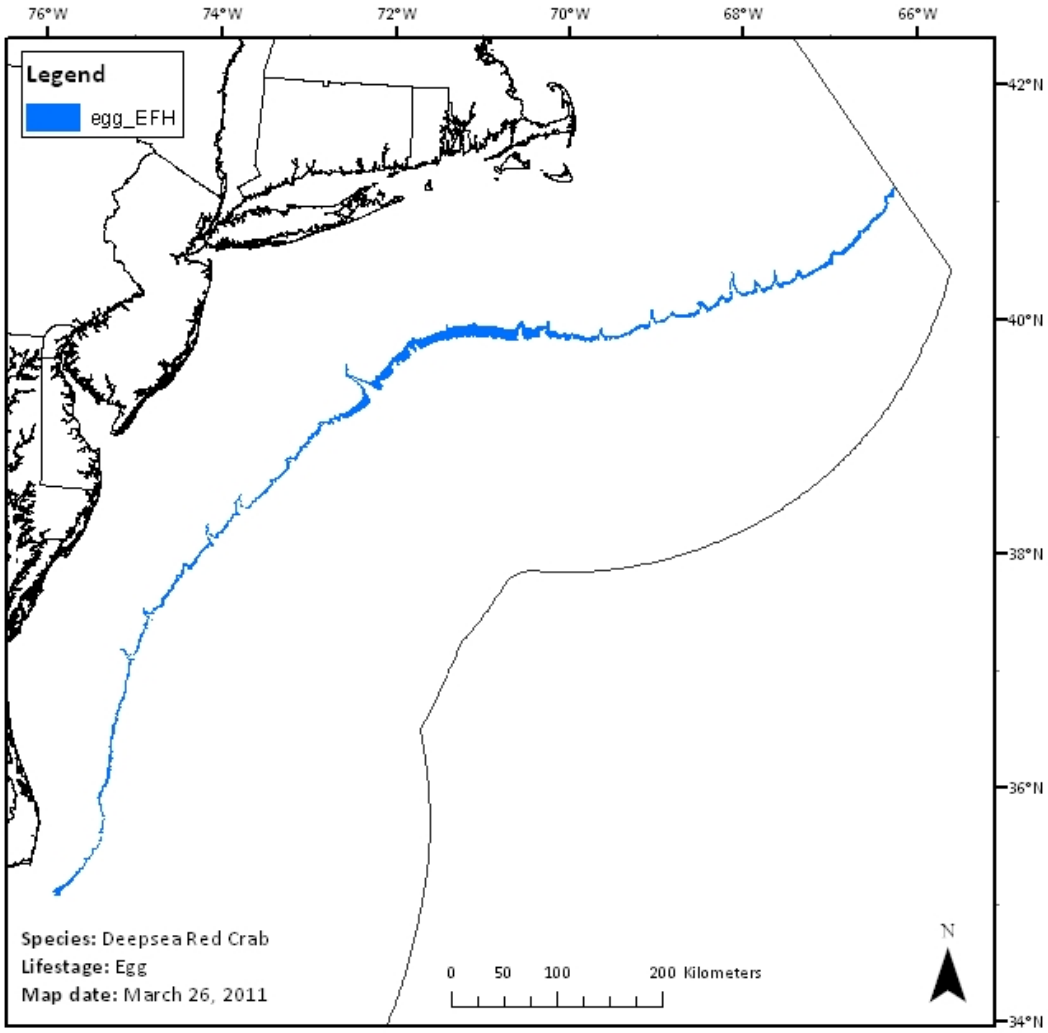
Eggs: Red crab eggs are brooded attached to the underside of female crabs until they hatch into larvae and are released into the water column. The EFH designation for red crab eggs is the same as the known distribution of egg-bearing females (320 – 640 meters) along the outer continental shelf and slope, as shown on Map 63.

Larvae: Near-surface water habitats on the outer continental slope and over Bear and Retriever seamounts across the entire depth range identified for the species (320 - 1300 meters on the slope and down to 2000 meters on the seamounts), as shown on Map 64.

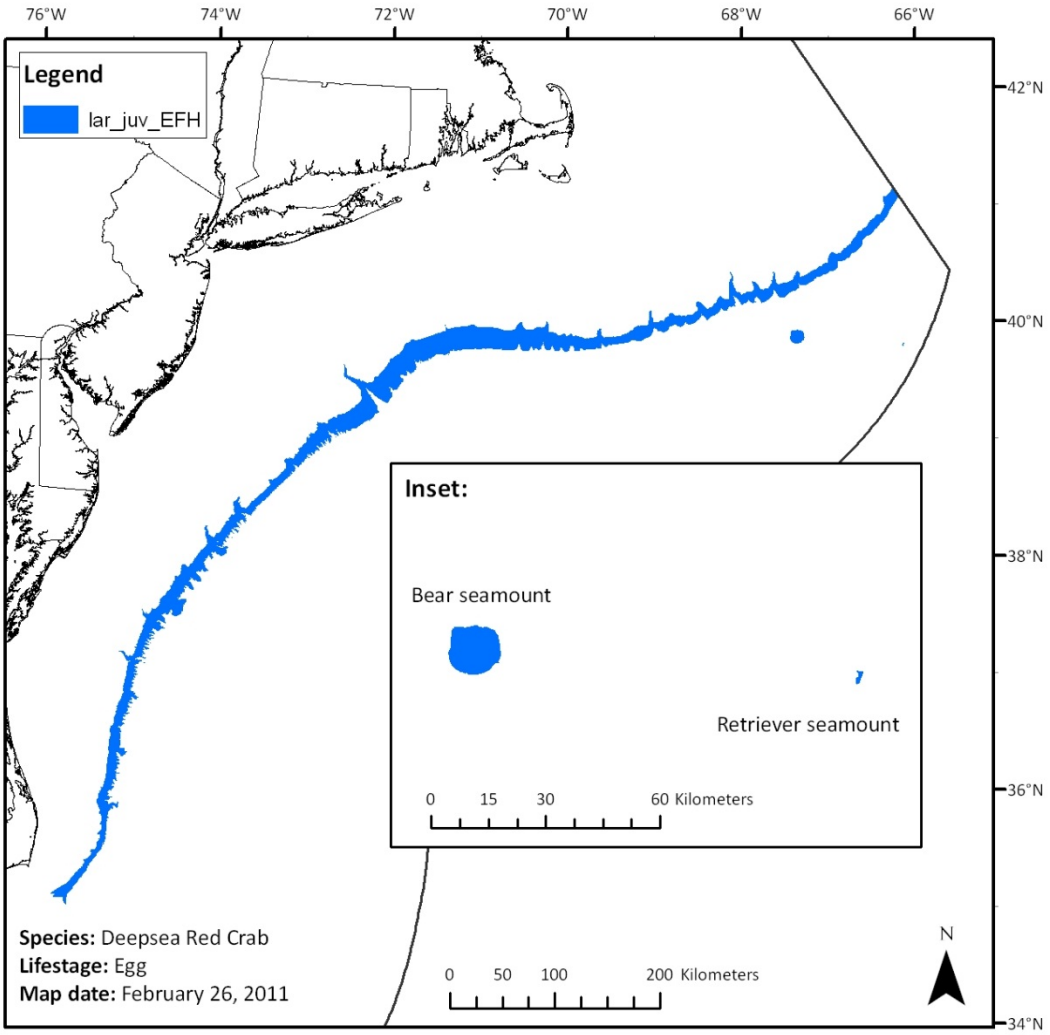
Juveniles: Bottom habitats with a silt-clay substrate and depths of 320 - 1300 meters on the continental slope, and to a maximum depth of 2000 meters on Bear and Retriever seamounts, as shown on Map 64.

Adults: Bottom habitats with silt-clay substrate and depths of 320 - 900 meters on the continental slope, and to a maximum depth of 2000 meters on Bear and Retriever seamounts, as shown on Map 65. Red crabs generally spawn on the slope at depths of 320 – 640 meters.

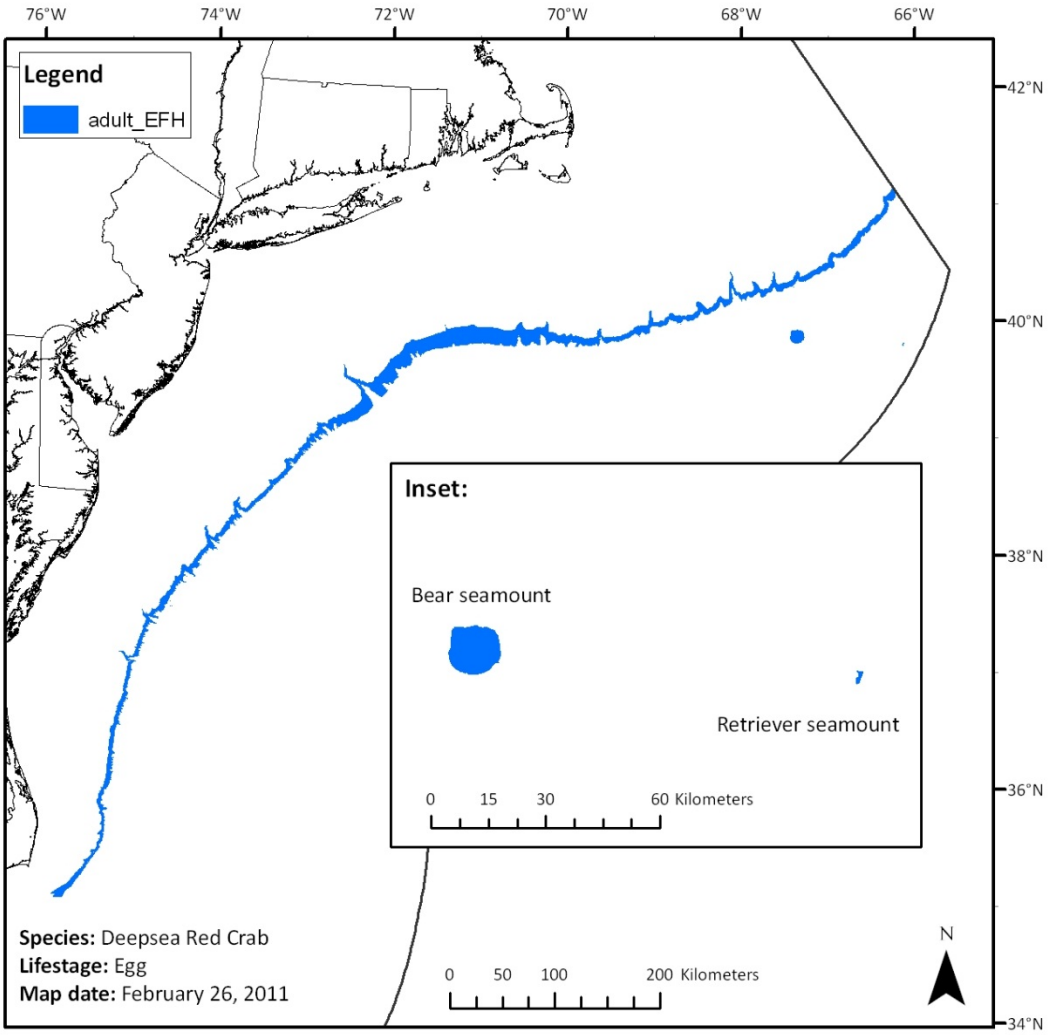
Map 63 – Deep-sea red crab egg EFH.



Map 64 – Deep-sea red crab larval and juvenile EFH.



Map 65 – Deep-sea red crab adult EFH.



1.5.5 Acadian redfish

There is no egg designation for redfish because the species is ovoviviparous, meaning that live young hatch from eggs brooded internally. Because the distribution of larval survey data for redfish larvae is very "patchy," the trawl survey data for juveniles were used in combination with the larval MARMAP data to map EFH for larval redfish.[48] The proposed EFH map for redfish larvae is based on the distribution of depths and bottom temperatures that are associated with high catch rates of juveniles in the 1963-2003

[48] The Council approved a larval and juvenile EFH map in 2007 that only used juvenile trawl survey data, without the larval data; this map failed to include the southern portion of Georges Bank where redfish larvae were collected during the MARMAP surveys.

spring and fall NMFS trawl surveys. It is also based on average juvenile catch per tow data in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 90th percentile of catch level, and includes inshore and continental slope areas where juvenile redfish were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys, and the maximum depth and geographic range where they were determined to be present on the slope. All the ten minute squares where larval redfish were collected during the MARMAP surveys were added to the proposed larval EFH map. The proposed adult redfish EFH map was created using the same methods and data sources that were used to map juvenile EFH, but using data specific to adults, not juveniles.

The status quo EFH maps for juvenile and adult redfish are the same and define EFH to be nearly the entire Gulf of Maine and deep water on the southern edge of Georges Bank.[49] The proposed new juvenile EFH map only extends as deep as 200 meters in the gulf and, therefore, excludes the deep basins. The new adult map highlights the outer Gulf of Maine and excludes areas surveyed by the NMFS that are shallower than 140 meters. Both maps would extend EFH on to the continental slope as far south as the reported range of the species off Virginia (37°38'N). The proposed juvenile map also includes nearshore waters in the Gulf of Maine that were not explicitly included in the status quo designation, but excludes some areas in the southwestern Gulf of Maine and on western Georges Bank that were designated originally.

The proposed text descriptions define more restricted depth ranges for juvenile and adult redfish EFH than the status quo designations, to 200 meters as opposed to 25-400 meters for juveniles, and 140-300 meters instead of 50-350 meters for adults, and add the upper continental slope down to 600 m for both life stages. The proposed new text description for juveniles also includes substrate information that is specific to young-of-the-year juveniles, while the proposed adult text description includes common attached epifauna (anemones, sponges, and corals) that provide shelter.

The proposed larval map, as modified, differs substantially from the map that was originally approved for the DEIS in 2007. There are now two separate maps for larval and juvenile redfish and, with the addition of the larval survey data that were left out of the original map, larval EFH now extends on to southern Georges Bank. The approved larval and juvenile EFH map now applies only to the juveniles, and was not otherwise modified. The modified adult EFH map covers a larger portion of the outer Gulf of Maine than the original approved map owing to an increase in the maximum depth from 200 to 300 meters.

[49] The adult distribution (100%) was used to map EFH for adults and juveniles in the status quo EFH designations.

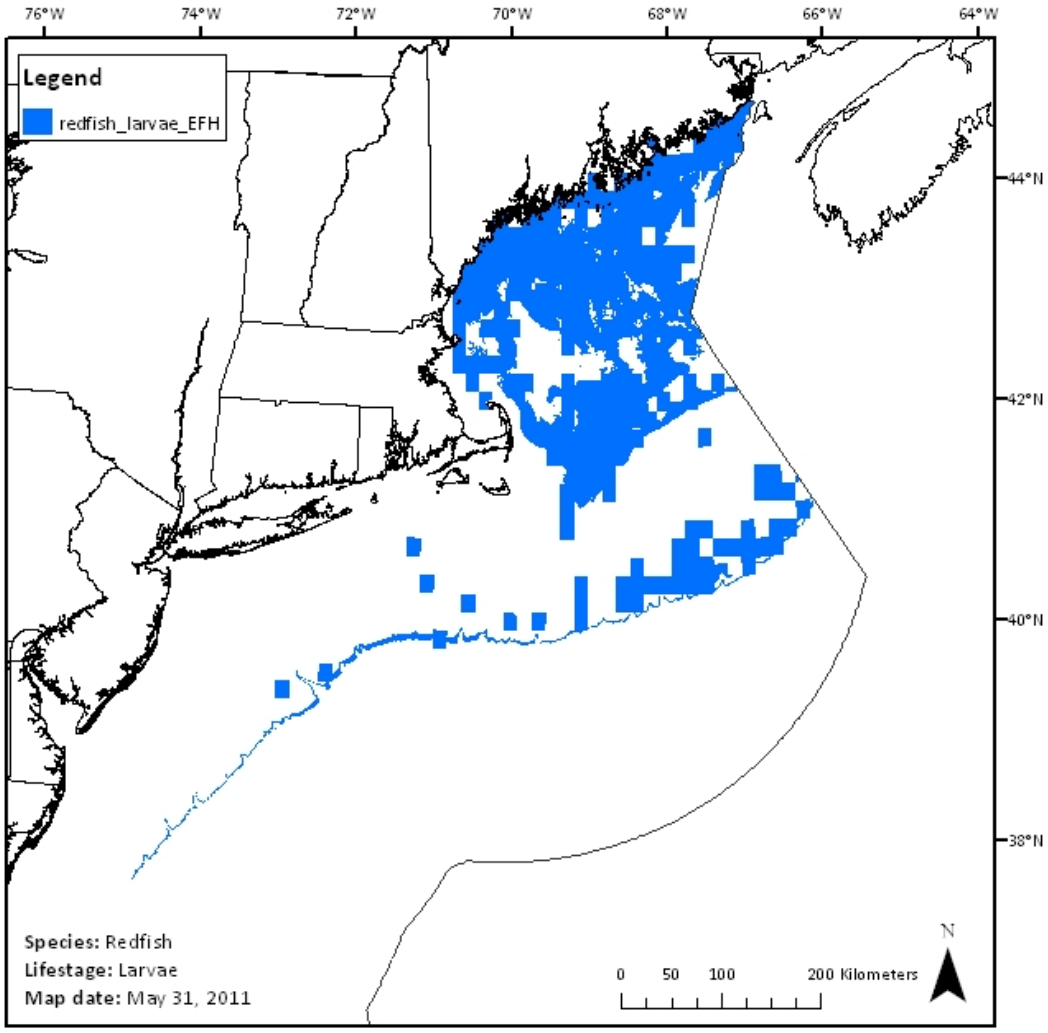
Text descriptions:
Essential fish habitat for redfish (*Sebastes fasciatus*) is designated anywhere within the geographic areas that are shown on the following maps and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Larvae: Pelagic habitats in the Gulf of Maine, on the southern portion of Georges Bank, and on the continental slope north of 37°38'N latitude, as shown on Map 66.

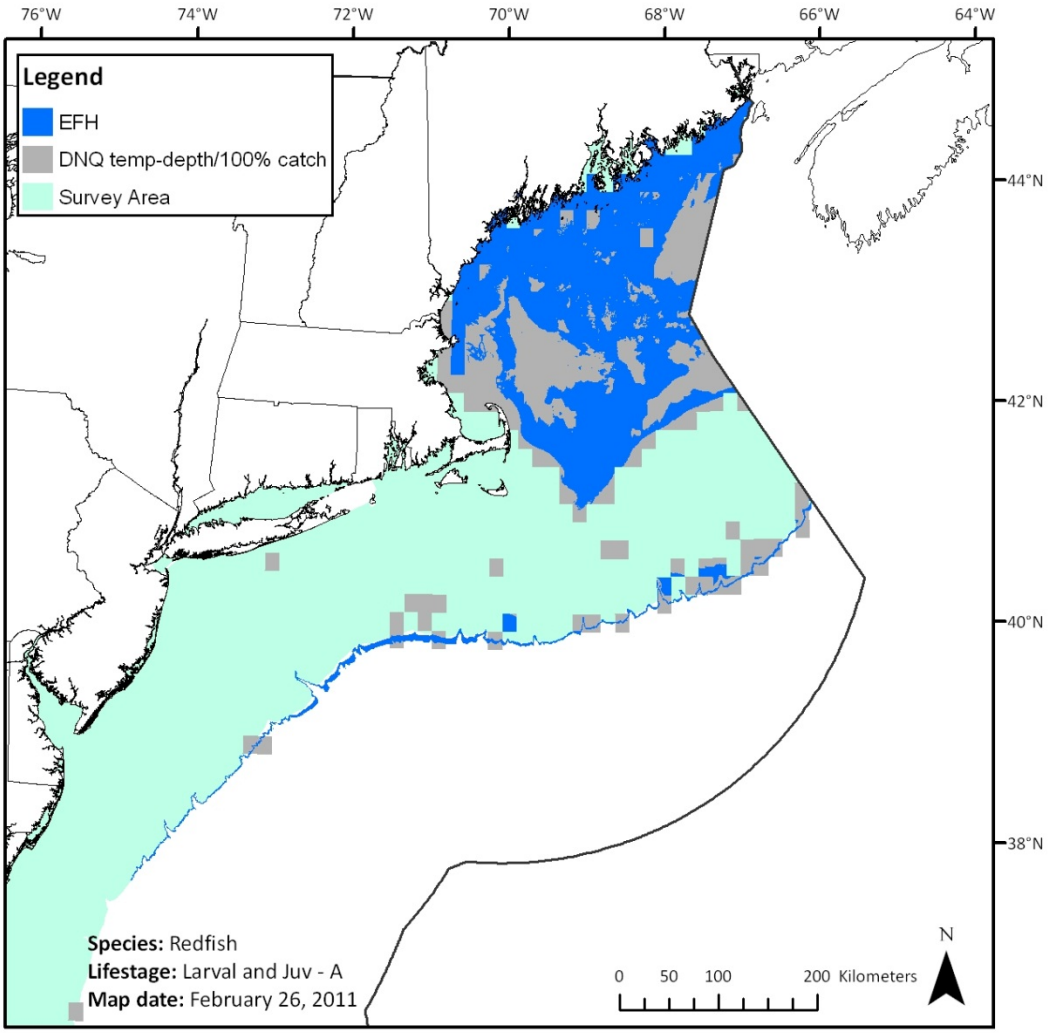
Juveniles: Sub-tidal coastal and offshore benthic habitats in the Gulf of Maine extending to a maximum depth of 200 meters, and on the continental slope to a maximum depth of 600 meters north of 37°38'N latitude (see Map 67). EFH for juvenile redfish includes a wide variety of bottom types, but primarily occurs on mud. Young-of-the-year juveniles are found on boulder reefs, while older juveniles are found in association with cerianthid anemones and other structure-forming benthic habitat features.

Adults: Offshore benthic habitats in the Gulf of Maine, primarily in depths between 140 and 300 meters, and on the continental slope to a maximum depth of 600 meters north of 37°38'N latitude (see Map 68). EFH for adult redfish includes a wide variety of bottom types, but primarily occurs on mud and hard bottom, which supports the growth of deep–water corals and other structure–forming sedentary epifauna such as sponges.

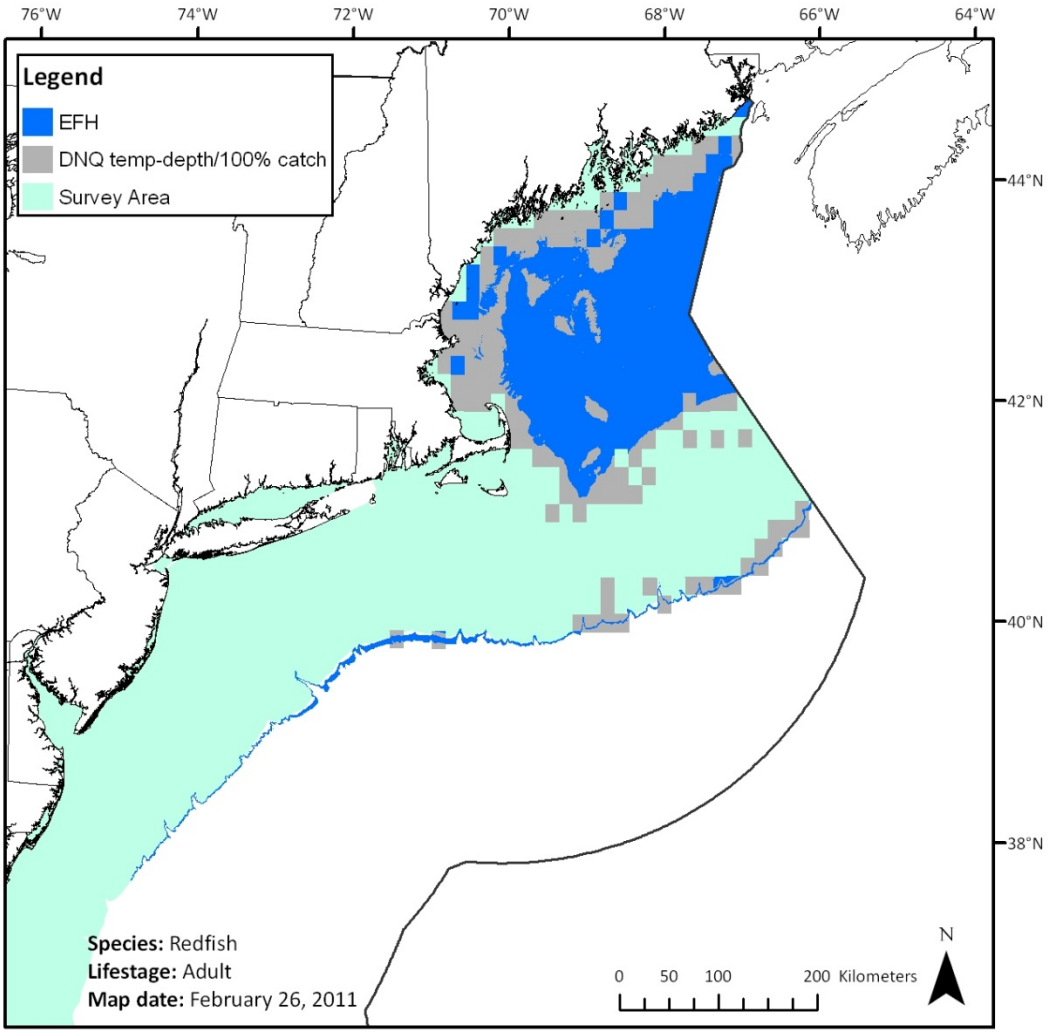
Map 66 – Redfish larval EFH.



Map 67 - Redfish juvenile EFH.



Map 68 – Redfish adult EFH.



1.5.6 Monkfish

The proposed EFH map for monkfish eggs and larvae is based on the distribution of adult and larval monkfish.[50] The proposed EFH map includes all the ten minute squares where adult monkfish were caught during 1968-2005 in the fall and spring NMFS trawl survey, plus all the ten minute squares where monkfish larvae were collected during 1978-1987 in the NMFS MARMAP ichthyoplankton survey. Inshore, the proposed designation includes ten minute squares where adult monkfish were caught in state trawl surveys in more than 10% of the tows. The proposed designation also includes the

[50] Monkfish eggs occur in large, mucoidal "veils" which are not sampled adequately in traditional ichthyoplankton surveys.

continental slope where monkfish larvae have been collected in the 1000-1500 meter depth range (see Appendix B). This designation was referred to as Alternative 4 in the Phase 1 DEIS.

The proposed EFH maps for juvenile and adult monkfish are based on the distributions of depths and bottom temperatures that are associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. The maps are also based on average catch per tow data in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75th percentile of catch level, and include the continental slope where juvenile or adult monkfish were determined to be present based on maximum depth information and the geographic range of the species. These designations were referred to as 3C alternatives in the Phase 1 DEIS.

The depth ranges given for both juveniles and adults in the status quo designations are very restricted (25-200 m) given the fact that monkfish occupy benthic habitats in very deep water beyond the edge of the continental shelf. The proposed designations would extend EFH more explicitly to the edge of the shelf and down to 1000 meters on the continental slope. The proposed EFH maps for all four life stages of monkfish are almost identical to the status quo maps.

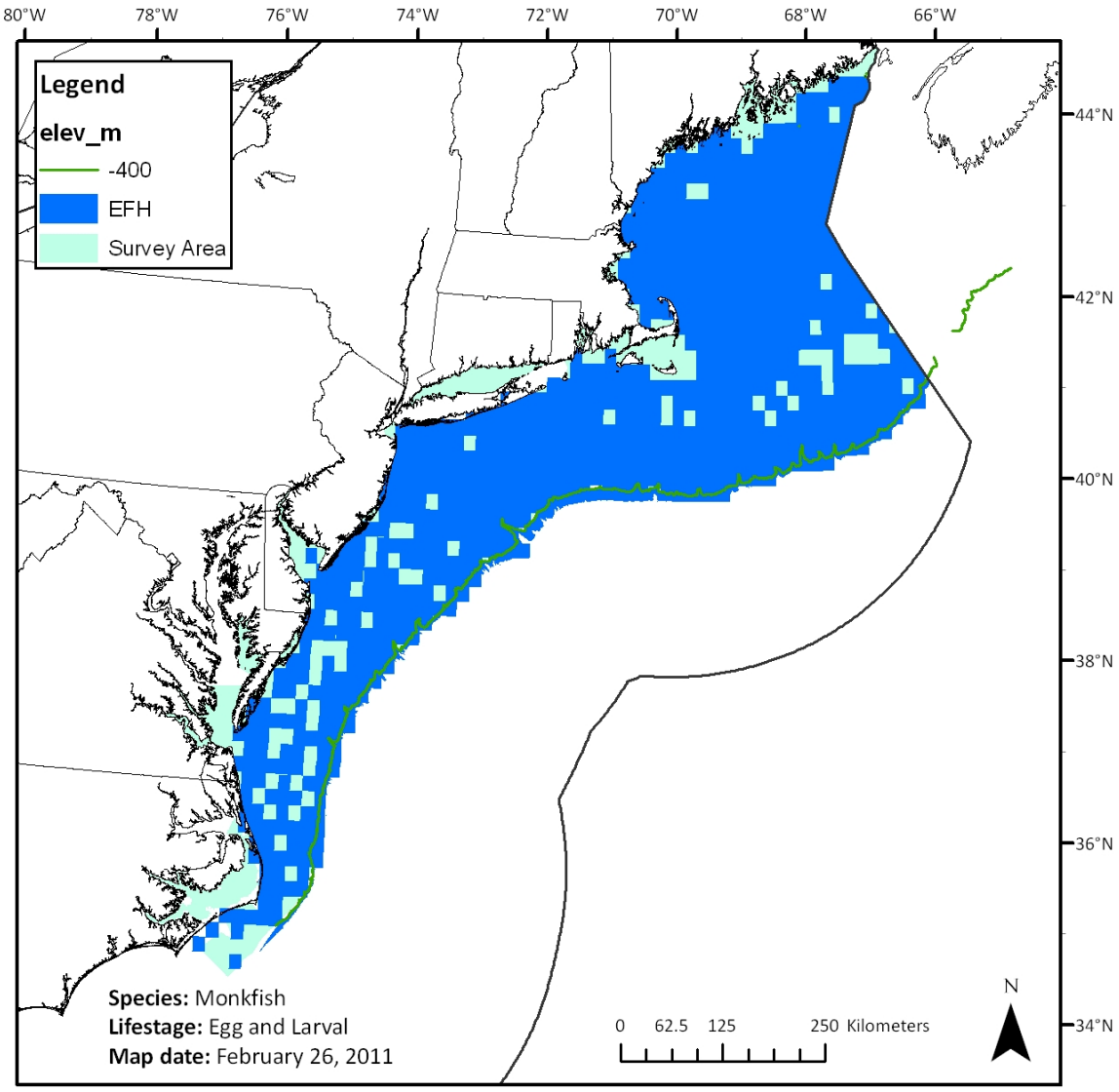
Text descriptions:
Essential fish habitat for monkfish (*Lophius americanus*) is designated anywhere within the geographic areas that are shown on the following maps and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs and Larvae: Pelagic habitats in inshore areas, and on the continental shelf and slope throughout the Northeast region, as shown on Map 69. Monkfish larvae are more abundant in the Mid-Atlantic region and occur over a wide depth range, from the surf zone to depths of 1000 to 1500 meters on the continental slope.

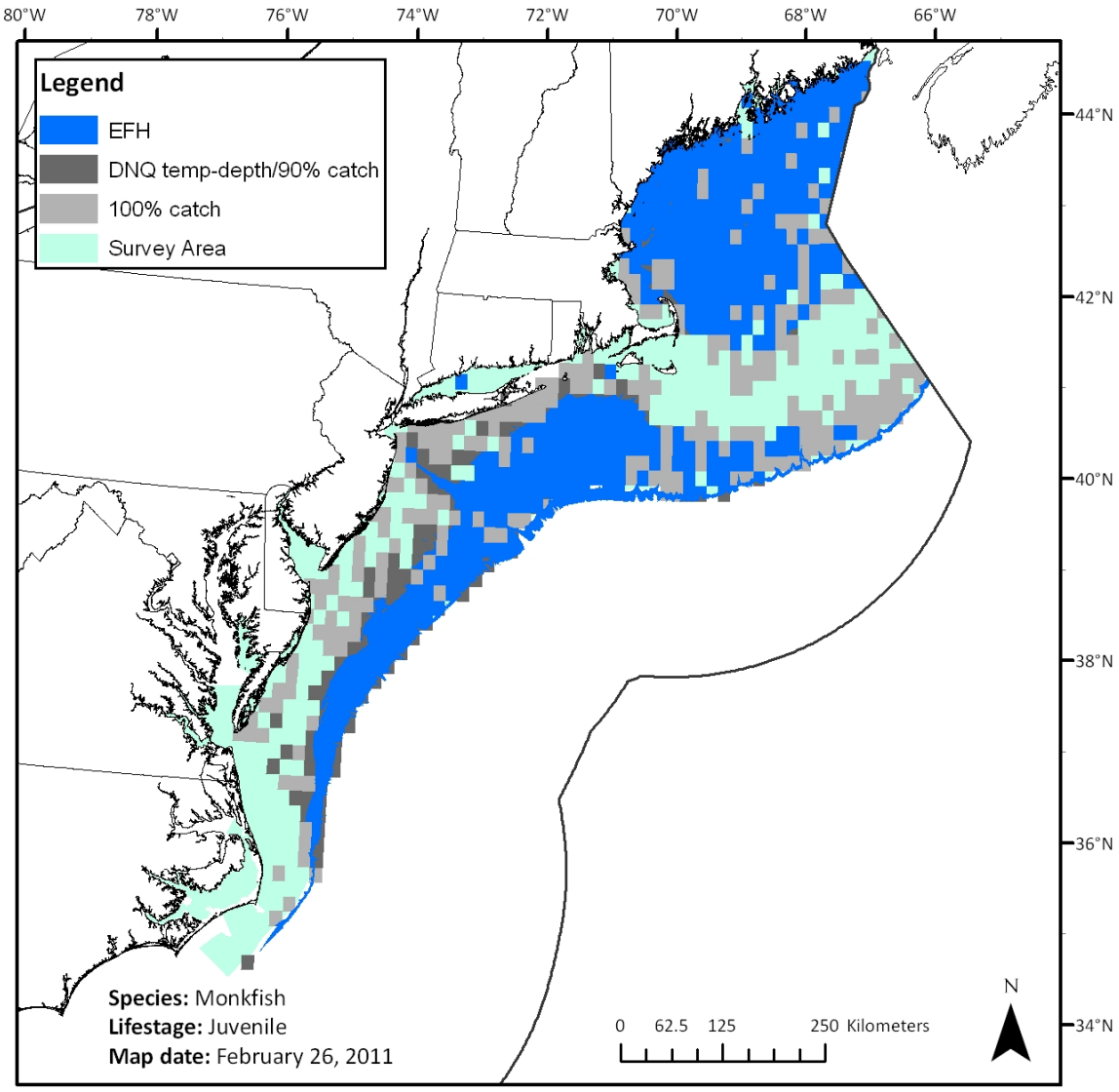
Juveniles: Sub-tidal benthic habitats in the Gulf of Maine and in the Mid-Atlantic region with substrates composed of hard sand, pebbles, gravel, broken shells, and soft mud in depths of 50 – 400 meters, and to a maximum depth of 1000 meters on the continental slope, as shown on Map 70. Young-of-the-year juveniles have been collected as deep as 900 meters on the slope.

Adults: Sub-tidal benthic habitats in the Gulf of Maine and in the Mid-Atlantic region with substrates composed of hard sand, pebbles, gravel, broken shells, and soft mud in depths of 50 – 400 meters, and to a maximum depth of 1000 meters on the continental slope, as shown on Map 71.

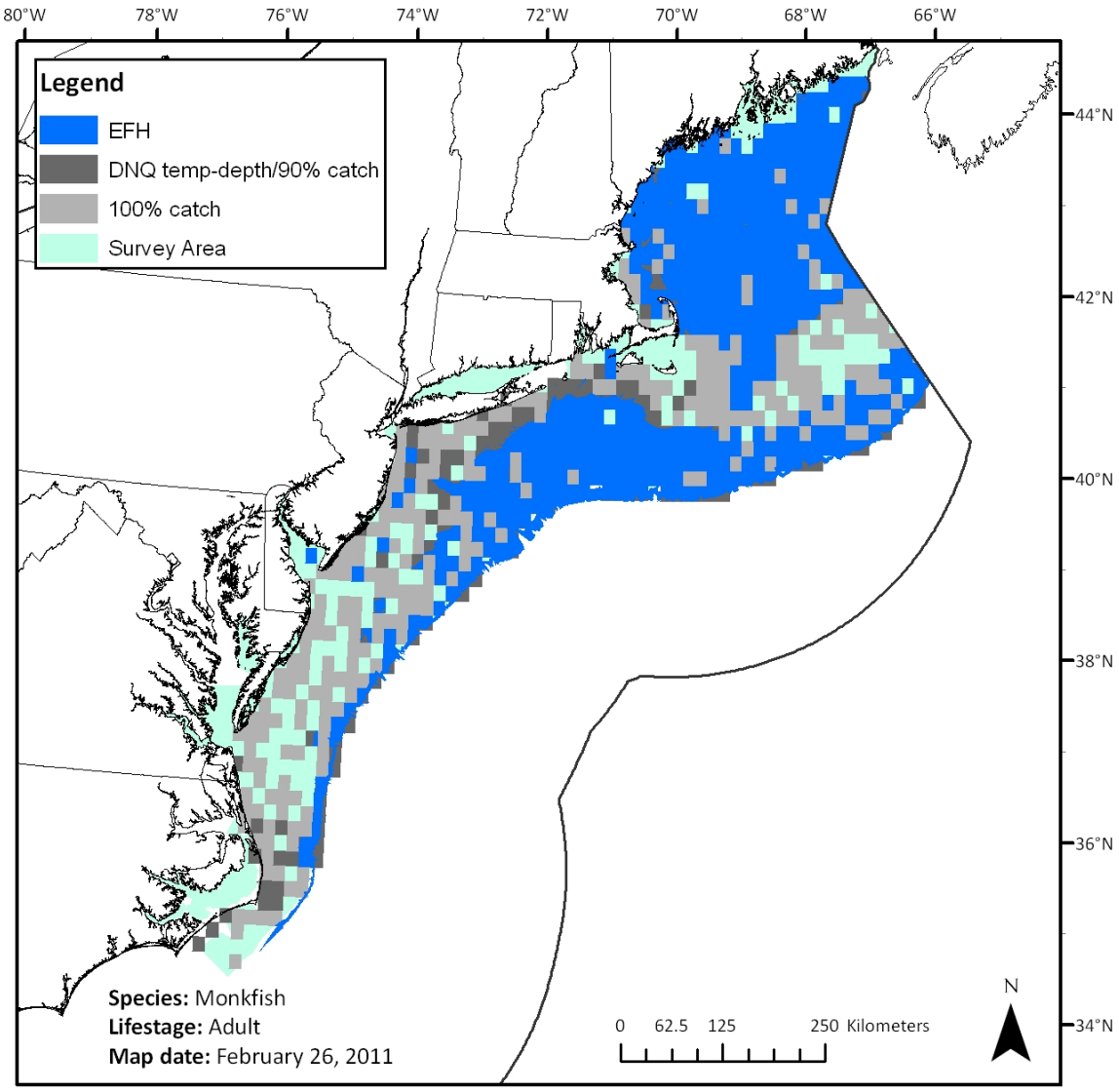
Map 69 – Monkfish egg and larval EFH.



Map 70 – Monkfish juvenile EFH.



Map 71 – Monkfish adult EFH.



1.5.7 Ocean pout

There is no true larval stage for this species, so the Council proposes to eliminate the status quo larval EFH designation and not replace it with anything. The proposed EFH map for ocean pout eggs is based on the average catch per tow of adults in ten minute squares of latitude and longitude during 1968-2005 in the fall and spring NMFS trawl survey at the 75th percentile of catch and is limited by the maximum depth (100 meters) at which this species reportedly spawns in the Gulf of Maine (see Appendix B). It also includes ten minute squares in inshore areas where adult ocean pout were caught in state trawl surveys in more than 10% of the tows, as well as those bays and estuaries identified by the NOAA ELMR program where ocean pout eggs were "common" or

"abundant." The proposed EFH text description increases the maximum depth for ocean pout eggs from 50 to 100 meters. The proposed map looks similar to the status quo map and the map that was approved in 2007 (Alternative 2C in the DEIS - see Appendix), but application of the 100 meter depth limit resulted in a clear definition of bathymetric features (e.g., Jeffreys Ledge and the Great South Channel) in the southwestern Gulf of Maine.[51]

The proposed EFH maps for juvenile and adult ocean pout are based on the distributions of depths and bottom temperatures that are associated with high catch rates of juveniles and adults, respectively, in the 1963-2003 spring and fall NMFS trawl surveys. They also are based on average catch per tow data for juveniles and adults in ten minute squares of latitude and longitude in the 1968-2005 spring and fall NMFS trawl surveys at the 75th percentile of catch level, and include inshore areas where juvenile or adult ocean pout were caught in 10% or more of tows made in individual ten minute squares during state trawl surveys, and ELMR information for coastal bays and estuaries. These designations were referred to as 3C alternatives in the Phase 1 DEIS.

The proposed juvenile and adult maps extend over the same geographical area as the status quo maps, but depict a specific depth range in the southwestern Gulf of Maine and in the Great South Channel, and, for the adults, on Georges Bank. For the juveniles, a number of ten minute squares in deep water (>120 m) in the Gulf of Maine that were included in the status quo EFH map and in the map that was approved in 2007 have been removed from the proposed new map. The proposed adult EFH map is very similar to the status quo adult map. Major modifications made to the new maps (since they were approved) were an increase in the maximum depths from 70 to 120 meters for the juveniles and 100 to 140 meters for the adults. The proposed text descriptions for juveniles and adults both define a wider variety of substrates than the status quo descriptions, with more specificity. They also extend EFH into deeper water (see above), and, in the case of the juveniles, the intertidal zone is specifically defined as EFH.

Text descriptions:
Essential fish habitat for ocean pout (*Macrozoarces americanus*) is designated anywhere within the geographic areas that are shown on the following maps and listed in Table 19 and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Hard bottom benthic habitats on Georges Bank, in the Gulf of Maine, and in the northern Mid-Atlantic Bight (see, Map 72), and in the high salinity zones of the bays and estuaries listed in Table 19. Eggs are laid in gelatinous masses, generally in sheltered

[51] The status quo map for ocean pout eggs combined the 90th percentile juvenile and adult survey data.

nests, holes, or rocky crevices. EFH for ocean pout eggs occurs in depths less than 100 meters.

Juveniles: Intertidal and sub-tidal benthic habitats in the Gulf of Maine and on the continental shelf north of Cape May, New Jersey, on the southern portion of Georges Bank, and in the high salinity zones of a number of bays and estuaries north of Cape Cod, extending from the shoreline (MHW) to a maximum depth of 120 meters (see Map 73 and Table 19). EFH for juvenile ocean pout occurs on a wide variety of substrates, including shells, rocks, algae, soft sediments, sand, and gravel.

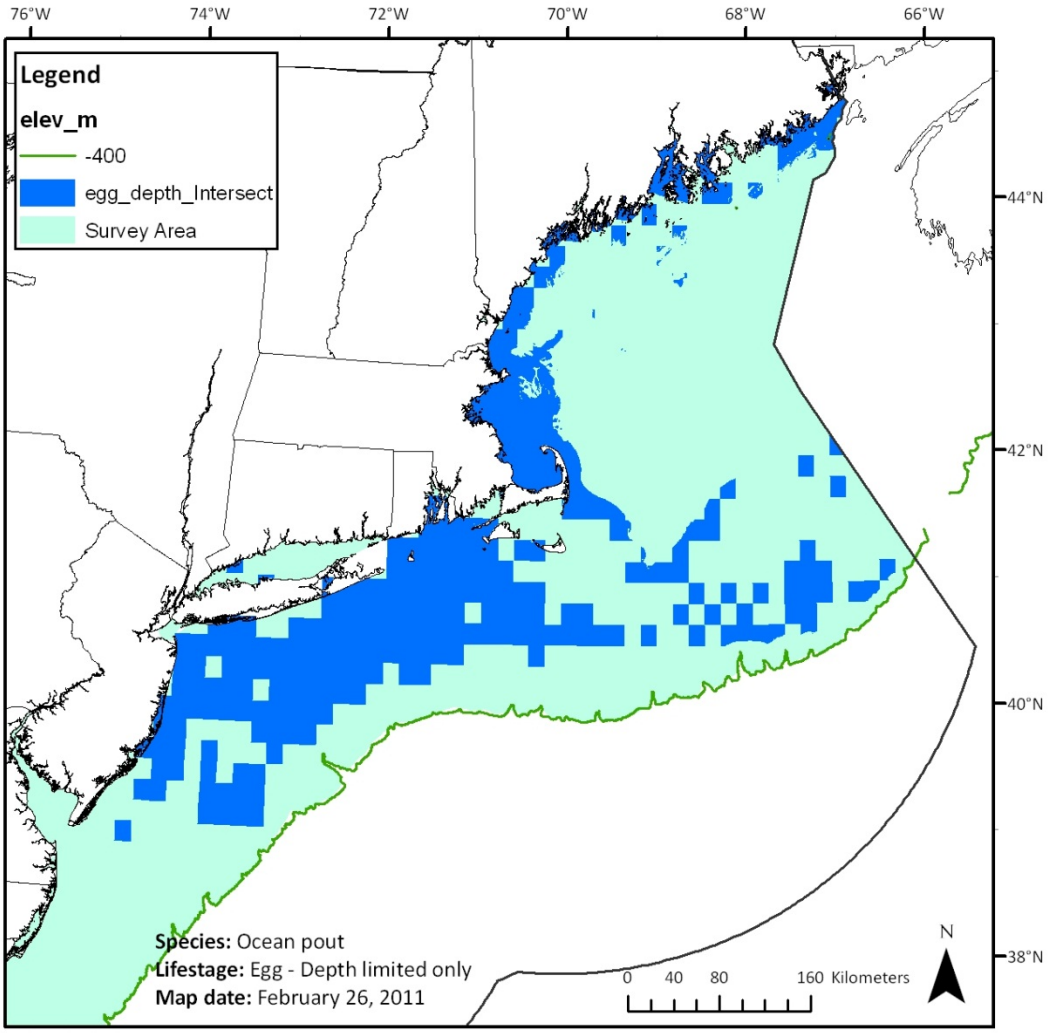
Adults: Sub-tidal benthic habitats in the Gulf of Maine, on Georges Bank, in coastal and continental shelf waters north of Cape May, New Jersey, and in the high salinity zones of a number of bays and estuaries north of Cape Cod, extending from the shoreline to a maximum depth of 140 meters (see Map 74 and Table 19). Adult ocean pout prefer sand and gravel substrates on the shelf (including shells), but are also found on muddy, sandy, and pebble and gravel bottom types in the Gulf of Maine. Ocean pout spawn on hard bottom in sheltered areas (e.g., boulder reefs in the Gulf of Maine) in depths less than 100 meters.

Table 19 – Ocean pout EFH designation for estuaries and embayments

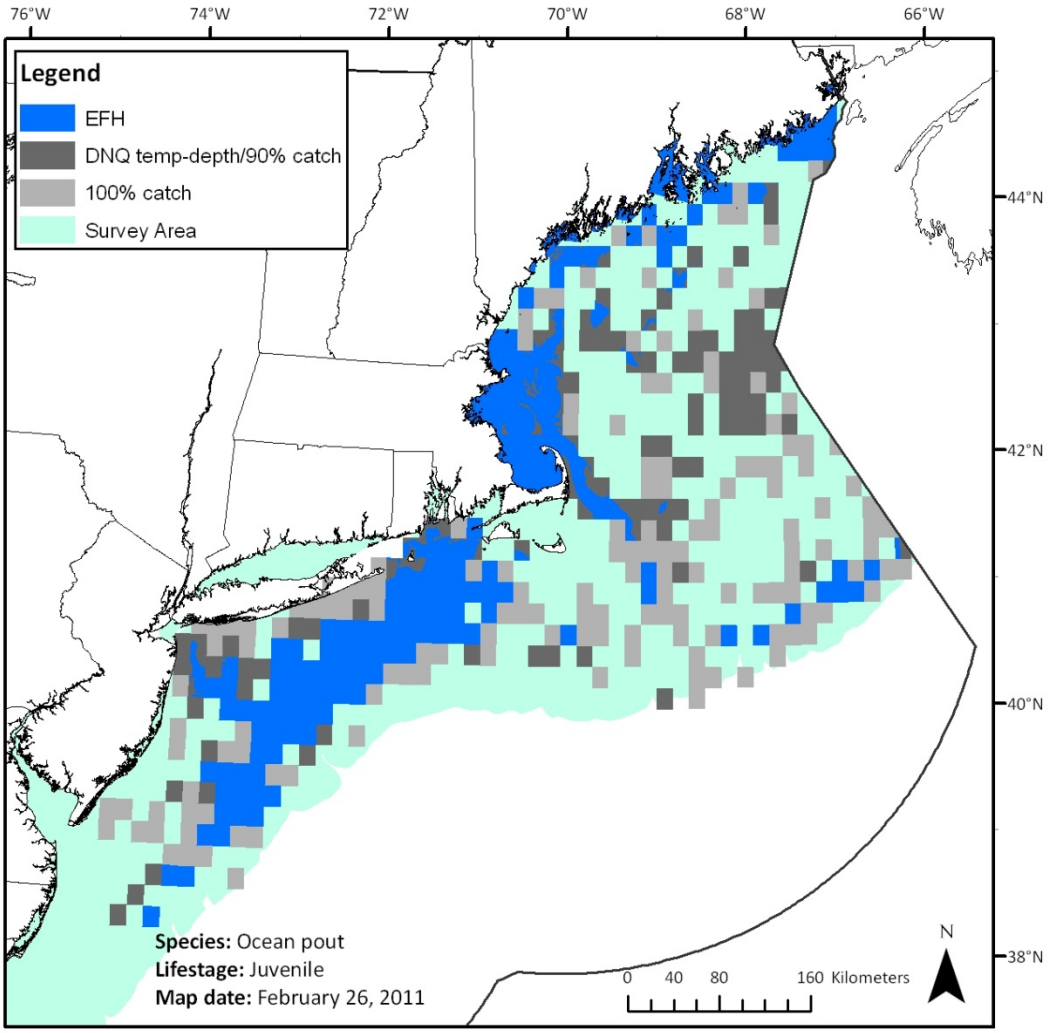
Estuaries and Embayments	Eggs	Juveniles	Adults
Passamaquoddy Bay	S	S	S
Englishman/Machias Bay	S	S	S
Narraguagus Bay	S	S	S
Blue Hill Bay	S	S	S
Penobscot Bay	S	S	S
Muscongus Bay	S	S	S
Damariscotta River	S	S	S
Sheepscot River	S	S	S
Kennebec / Androscoggin	S	S	S
Casco Bay	S	S	S
Saco Bay	S	S	S
Massachusetts Bay	S	S	S
Boston Harbor	S	S	S
Cape Cod Bay	S	S	S

S ≡ The EFH designation for this species includes the seawater salinity zone of this bay or estuary (salinity > 25.0‰).
M ≡ The EFH designation for this species includes the mixing water / brackish salinity zone of this bay or estuary (0.5 < salinity < 25.0‰).

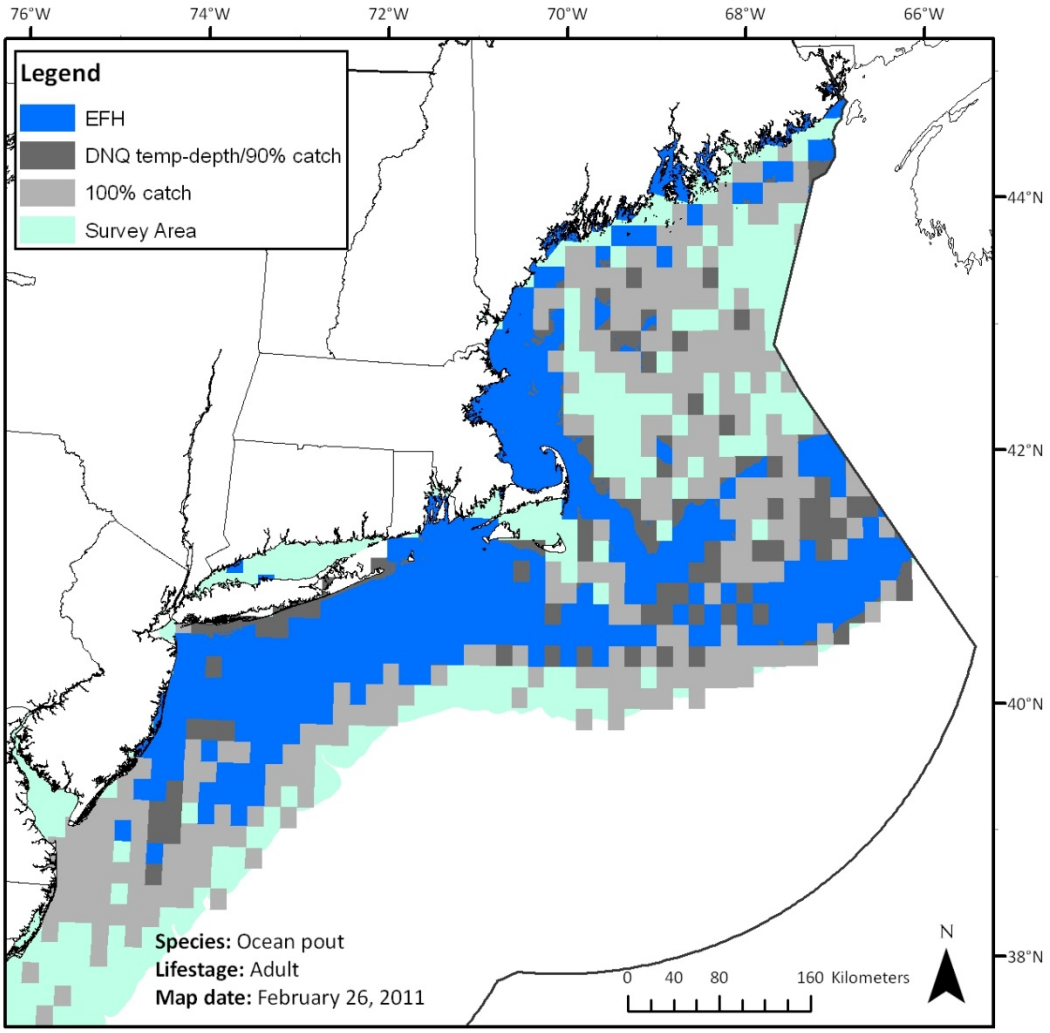
Map 72 – Ocean pout egg EFH.



Map 73 – Ocean pout juvenile EFH.



Map 74 – Ocean pout adult EFH.



1.5.8 Atlantic wolffish

The status quo EFH designation for Atlantic wolffish was approved in Amendment 16 to the Northeast Multispecies FMP when this species was added to the multispecies fishery management unit. Since that time, additional habitat-related information has been compiled in a NMFS status review report that was prepared in response to a petition to list this species as endangered or threatened pursuant to the Endangered Species Act (Atlantic Wolffish Biological Review Team [BRT] 2009). The information in this report, and in the primary sources cited in the review, was used to revise the status quo text description. Supplementary habitat information was removed from the status quo EFH text descriptions and put into a table in Appendix B, along with information on spawning times and behavior and prey. The map showing the maximum possible

extent of EFH for all four life stages of Atlantic wolffish (Map 18) in the new proposed designation is nearly identical to the status quo map: small areas that were missing in the original map (e.g., along the Hague Line) were filled in. The status quo EFH designation was approved by the Council in June 2009.

The proposed EFH designations for Atlantic wolffish include more specific habitat descriptions than the status quo designations. The depth and temperature ranges that define EFH for the juveniles and adults are based on an analysis of NMFS trawl survey data (see BRT report) and, for spawning adults, depth and substrate information has been up-dated using information that was compiled by the Atlantic Wolffish Biological Review Team, which was not available when the original text descriptions were written.[52]

Text descriptions:
Essential fish habitat for Atlantic wolffish (*Anarhichas lupus*), is designated anywhere within the geographic areas that are shown on Map 75 and meets the following conditions. Additional habitat-related information for this species can be found in Appendix B.

Eggs: Sub-tidal benthic habitats at depths <100 meters within the geographic area shown on Map 75. Wolffish egg masses are hidden under rocks and boulders in nests.

Larvae: Pelagic and sub-tidal benthic habitats within the geographic area shown on Map 75.

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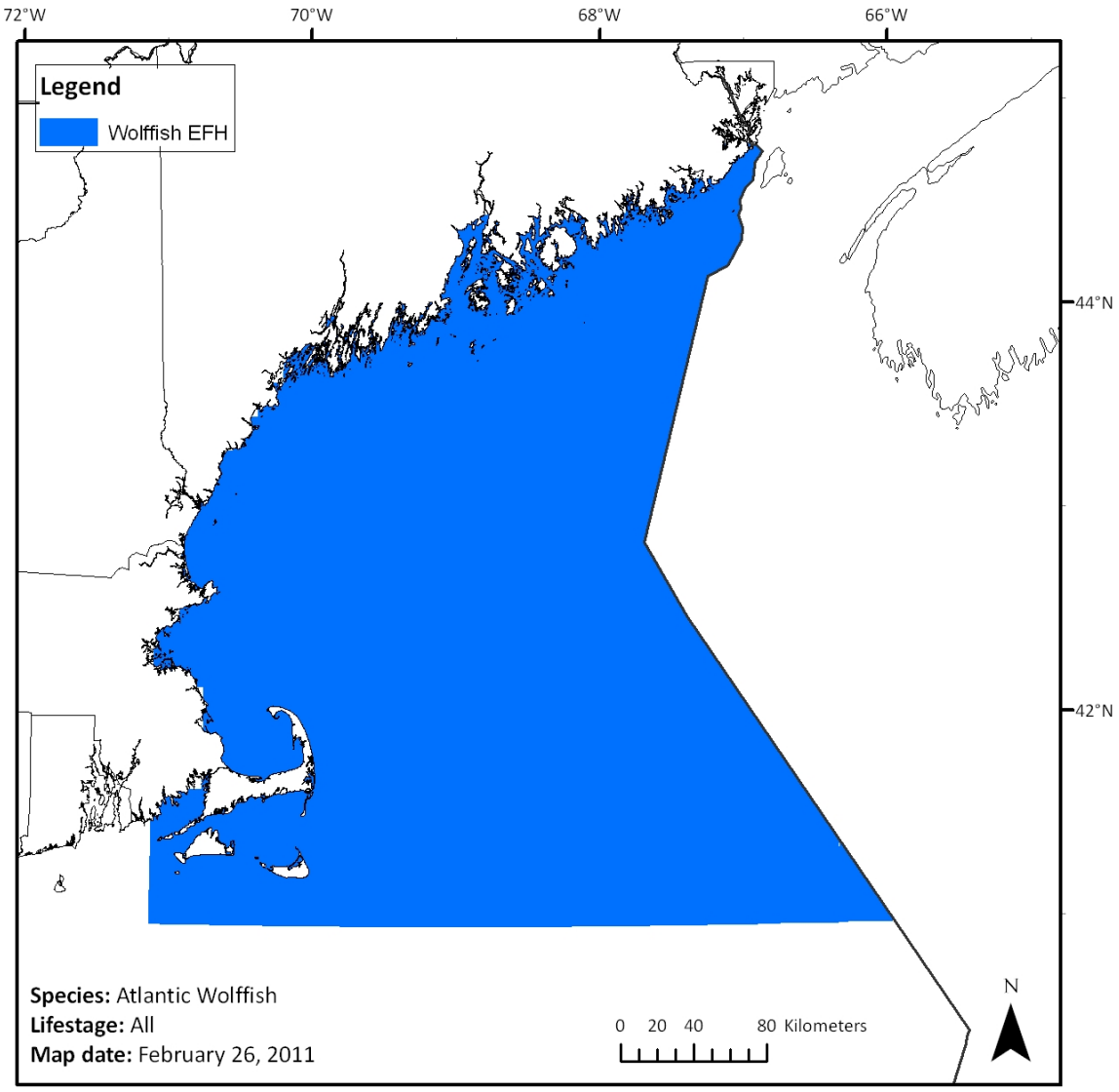
[52] There is no reliable information from the Northeast region that could be used to determine the length at 50% maturity (L_{50}) for this species, but there is published information from other locations in the North Atlantic to support a length of 65cm. Wolffish are unusual in that eggs partially develop in the ovaries and may remain there for years until the time when the female is ready to spawn, at which point the eggs complete their development (and get much larger). Female Atlantic wolffish caught in NMFS trawl surveys have been examined over the years to determine their stage of maturity, but simply classified as having visible eggs or not. More systematic gonadal studies of this species from Iceland and the Canadian maritime provinces clearly show that L_{50} is indirectly related to temperature which affects growth, with fish in colder water growing more slowly and therefore reaching the age at maturity at smaller sizes. Female Atlantic wolffish are 50% mature at 51 cm in Labrador, at 61 cm on the northern Grand Bank, and at 68 cm on the southern Grand Bank where bottom temperatures are warmer (Templeman 1986). Atlantic wolffish from the colder eastern side of Iceland reach L_{50} at 72.6 cm and from the warmer western side of the island at 63.6 cm (Gunnarsson et al. 2006). It seems reasonable to assume that bottom water temperatures in the Gulf of Maine are more similar to western Iceland and the southern Grand Bank. None of the females larger than 65 cm examined during the NMFS trawl surveys in the Gulf of Maine were without eggs and those with eggs ranged from 30 to over 100 cm in length (Northeast Data Poor Stocks Working Group 2009).

Juveniles: (<65 cm total length): Sub-tidal benthic habitats at depths of 70-184 meters within the geographic area shown on Map 75. Juvenile Atlantic wolffish do not have strong substrate preferences.

Adults: (≥65 cm total length)**:** Sub-tidal benthic habitats at depths less than 173 meters within the geographic area shown on Map 75. Adult Atlantic wolffish have been observed spawning and guarding eggs in rocky habitats in less than 30 meters of water in the Gulf of St. Lawrence and Newfoundland and in deeper (50-100 meters) boulder reef habitats in the Gulf of Maine. Egg masses have been collected on the Scotian Shelf in depths of 100-130 meters, indicating that spawning is not restricted to coastal waters. Adults are distributed over a wider variety of sand and gravel substrates once they leave rocky spawning habitats, but are not caught over muddy bottom.

Map 75 – Atlantic wolffish EFH, all life stages.



Note: EFH for Atlantic wolffish is limited to waters north of 41˚N latitude and east of 71˚W longitude.

2.0Alternatives to designate Habitat Areas of Particular Concern

The EFH Final Rule (50 CFR 600.815(8)) states that "*FMPs should identify specific habitat types or areas within EFH as habitat areas of particular concern based on one or more of the following considerations… (underlined text)*". The corresponding text is a Council interpretation of the EFH Final Rule criteria.

- CRITERION 1A: Importance of *Historic* Ecological Function - The area or habitat feature proposed for HAPC designation at one time provided an important ecological function to a currently managed species, but no longer provides that function due to some form of degradation. An important ecological function could include, but is not limited to, protection from predation, increased food supply, appropriate spawning sites, egg beds, etc. The importance of the ecological function should be documented in scientific literature and based on either field studies, laboratory experiments, or a combination of the two.

- CRITERION 1B: Importance of *Current* Ecological Function - The area or habitat feature proposed for HAPC designation currently provides an important ecological function to a managed species. An important ecological function could include, but is not limited to, protection from predation, increased food supply, appropriate spawning sites, egg beds, etc. The importance of the ecological function should be documented in scientific literature and based on either field studies, laboratory experiments, or a combination of the two.

- CRITERION 2: Sensitivity to Anthropogenic Stresses – The area or habitat feature proposed for HAPC designation is particularly sensitive (either in absolute terms or relative to other areas and/or habitat features used by the target species) to the adverse effects associated with anthropogenic activities. These activities may be fishing or non-fishing related. The stress or activity must be a recognizable or perceived threat to the area of the proposed HAPC.

- CRITERION 3: Extent of Current or Future Development Stresses – The area or habitat feature proposed for HAPC designation faces either an existing and on-going development-related threat or a planned or foreseeable development-related threat. Development-related threats may result from, but are not limited to, activities such as sand mining for beach nourishment, gravel mining for construction or other purposes, the filling of wetlands, salt marsh, or tidal pools, shoreline alteration, channel dredging (but not including routine maintenance dredging), dock construction, marina construction, etc.

- CRITERION 4: Rarity of the Habitat Type – The habitat features proposed for HAPC designation are considered "rare" either at the scale of the New England region or at the scale of the range of at least one life history stage of one or more Council-managed species. A "rare" habitat feature is one that is considered to occur infrequently, is uncommon, unusual, or highly valued owing to its uniqueness. Rare habitats or features may be those that are spatially or temporally very limited in extent, but this description could also be applied to a unique combination of common features that occur only in a very few places.

Designation of habitat areas of particular concern (HAPCs) is intended to indicate which areas within EFH should receive more of the Council's and NMFS' attention when providing comments on federal and state actions, and in establishing higher standards to protect and/or restore such habitat. Habitats that are at greater risk from various sources of impacts, either individual or cumulative, including impacts from fishing, may be appropriate for this classification. Habitats that are limited in nature or those that provide critical refugia (such as sanctuaries or preserves) may also be appropriate. During the EFH consultation process, general concurrences (i.e. authorizations for groups of activities by an agency) may be granted for activities within habitat areas of particular concern; however, greater scrutiny is necessary prior to approval of the general concurrence.

It is important to note that while an area's status as a HAPC should lead to more careful evaluations of the impacts of fishing in that area, no management measures, such as gear restrictions, are associated with individual HAPCs. However, there are currently cases where HAPCs and a habitat/EFH closure areas overlap, such as on the northern edge of Georges Bank and in the Western Gulf of Maine Closed Area, and there may be other areas where such overlapping designations are appropriate. As the HAPC and closure/gear restricted area designations are separate, changing one designation does not affect the existence of the other designation. For example, it might be appropriate to consider a wider area for HAPC designation, and then choose a smaller area for a gear restricted area because the smaller area is more practicable given the value of the area to certain fisheries. Alternatively, there may be HAPCs for which non-fishing impacts are the primary concern, such that management measures intended to reduce fishing impacts would be neither appropriate nor useful.

The Atlantic Salmon HAPC and the Northern Edge Cod HAPC are currently in place. Other HAPCs were proposed during Phase 1 and approved by the Council in 2007. Between December 2004 and March 2005, the Council solicited HAPC proposals from the public for HAPCs that (in no particular order): (1) will improve the fisheries management in the EEZ, (2) include EFH designations for more than one Council-managed species in order to maximize the benefit of the designations, (3) include juvenile cod EFH, (4) meet more than one of the EFH Final Rule HAPC criteria. Nine complete proposals were received by the Council and reviewed by the Habitat Plan Development Team, Habitat Advisory Panel and Habitat Oversight Committee. The HAPCs approved by the Council during Phase 1 include the following:

- Inshore Juvenile Cod HAPC
- Great South Channel Juvenile Cod HAPC
- Cashes Ledge Area HAPC
- Jeffrey's Ledge/Stellwagen Bank HAPC
- Bear and Retriever Seamounts with identifiable EFH HAPC
- Heezen Canyon HAPC

- Lydonia/Gilbert/Oceanographers Canyons HAPC
- Hydrographer Canyon HAPC
- Veatch Canyon HAPC
- Alvin/Atlantis Canyon HAPC
- Hudson Canyon HAPC
- Hendrickson/Toms/Middle Toms Area HAPC
- Wilmington Canyon HAPC
- Baltimore Canyon HAPC
- Washington Canyon HAPC
- Norfolk Canyon HAPC

Because some of these areas as originally identified exceeded the depth of the proposed EFH designations, the boundaries of various seamount and canyon HAPCs were limited according to the depth of proposed EFH.

2.1 Atlantic salmon HAPC (status quo)

Seven small, coastal drainages located in the downeast and mid-coast sections of Maine hold the last remaining populations of native Atlantic salmon in the United States (USFWS 1996). These important rivers are the Dennys, Machias, East Machias, Pleasant, Narraguagus, Ducktrap, and Sheepscot. In 1998 (EFH Omnibus Amendment 1), the Council concluded that the designation of the following eleven rivers in Maine met at least two criteria for designation as habitat areas of particular concern for Atlantic salmon: Dennys, Machias, East Machias, Pleasant, Narraguagus, Ducktrap, Sheepscot, Kennebec, Penobscot, St. Croix, and Tunk Stream (Map 76).

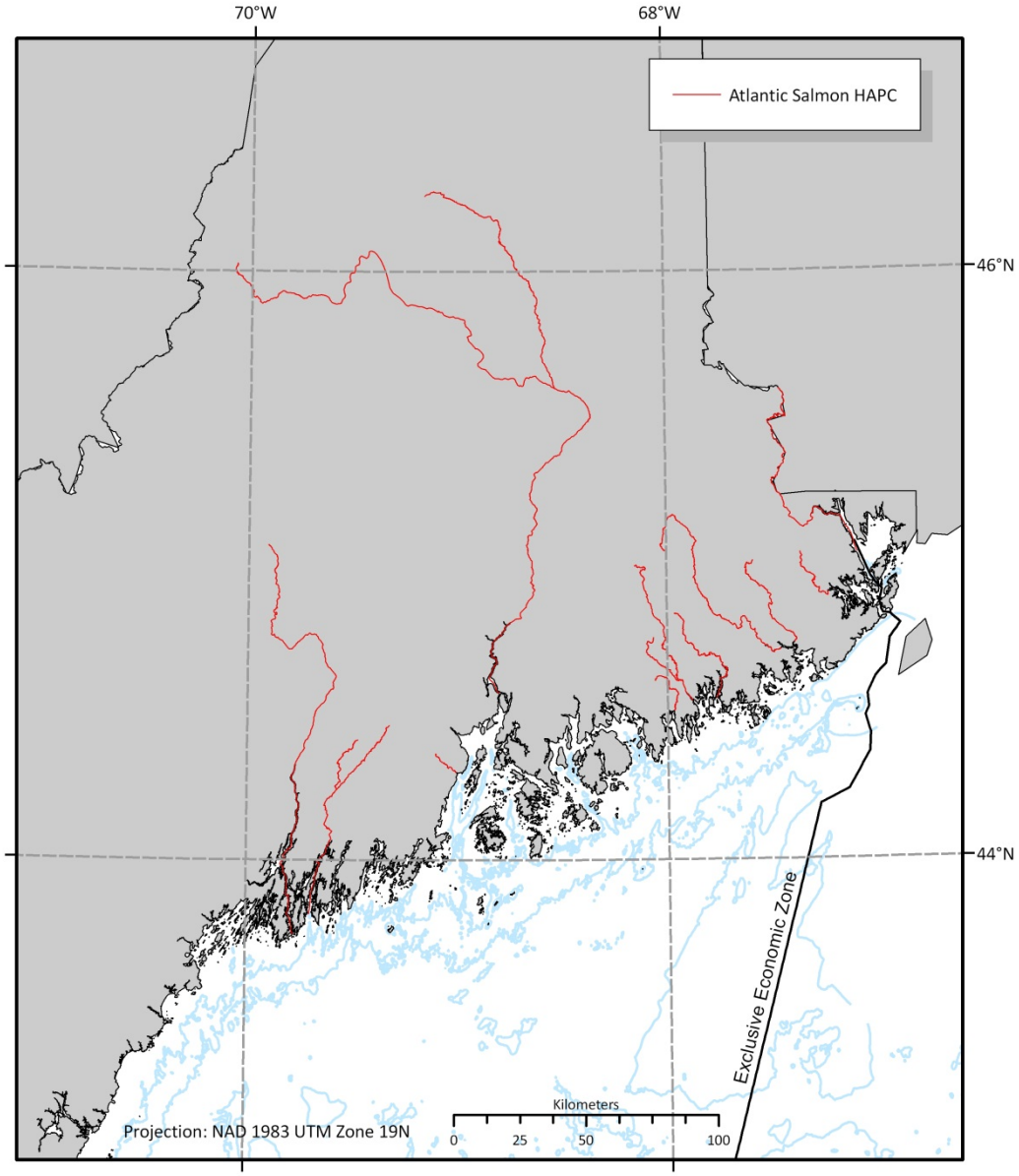
The U.S. Fish and Wildlife Service (USFWS) and NMFS listed the U.S.A., ME, Gulf of Maine Distinct Population Segment (DPS) of Atlantic salmon as endangered on July 20, 2009. A DPS is a population of vertebrates that is discrete and ecologically significant. According to USFWS, "*the GOM DPS includes 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 Green Lake National Fish Hatchery*

(GLNFH) and Craig Brook National Fish Hatchery (CBNFH). Excluded are landlocked salmon and those salmon raised in commercial hatcheries for aquaculture."

Table 20 –Atlantic Salmon HAPC: summary of alignment with HAPC criteria from both the EFH Final Rule and the Council

Criteria or preference	***Criteria or preference met?***	***Discussion***
Importance of Historic or Current Ecological Function (EFH Final Rule criteria)	Yes	By supporting the only remaining U.S. populations of naturally spawning Atlantic salmon that have historic river-specific characteristics, these rivers provide an important ecological function. These river populations harbor an important genetic legacy that is vital to the persistence of these populations and to the continued existence of the species in the United States.
Sensitivity to Anthropogenic Stresses (EFH Final Rule criteria)	Yes	The habitat of these rivers is susceptible to a variety of human-induced threats, from dam construction and hydropower operations to logging, agriculture, and aquaculture activities. Human activities can threaten the ability of Atlantic salmon to migrate upriver to the spawning habitat, the quality and quantity of the spawning and rearing habitat, and the genetic integrity of the native populations contained in the rivers.
Extent of Current or Future Development Stresses (EFH Final Rule criteria)	No	This criterion was not used as a justification for the status quo Atlantic salmon HAPC in the 1998 EFH Omnibus Amendment #1.
Rarity of the Habitat Type (EFH Final Rule criteria)	No	This criterion was not used as a justification for the status quo Atlantic salmon HAPC in the 1998 EFH Omnibus Amendment #1.
Will improve the fisheries management in the EEZ (Council preference)	Yes	May assist in the rebuilding of the Atlantic salmon population, an ESA species.
Include EFH designations for more than one Council-managed species (Council preference)	No	Salmon EFH only
Include juvenile cod EFH (Council preference)	No	Salmon EFH only
Meet more than one of the EFH Final Rule HAPC criteria (Council preference)	Yes	Ecological function and sensitivity to anthropogenic stress criteria

Map 76 – Atlantic salmon HAPC



2.2 Northern Edge Juvenile Cod HAPC (status quo)

The 188-nm² Northern Edge Juvenile Cod HAPC was designated via EFH Omnibus Amendment 1 in 1998.

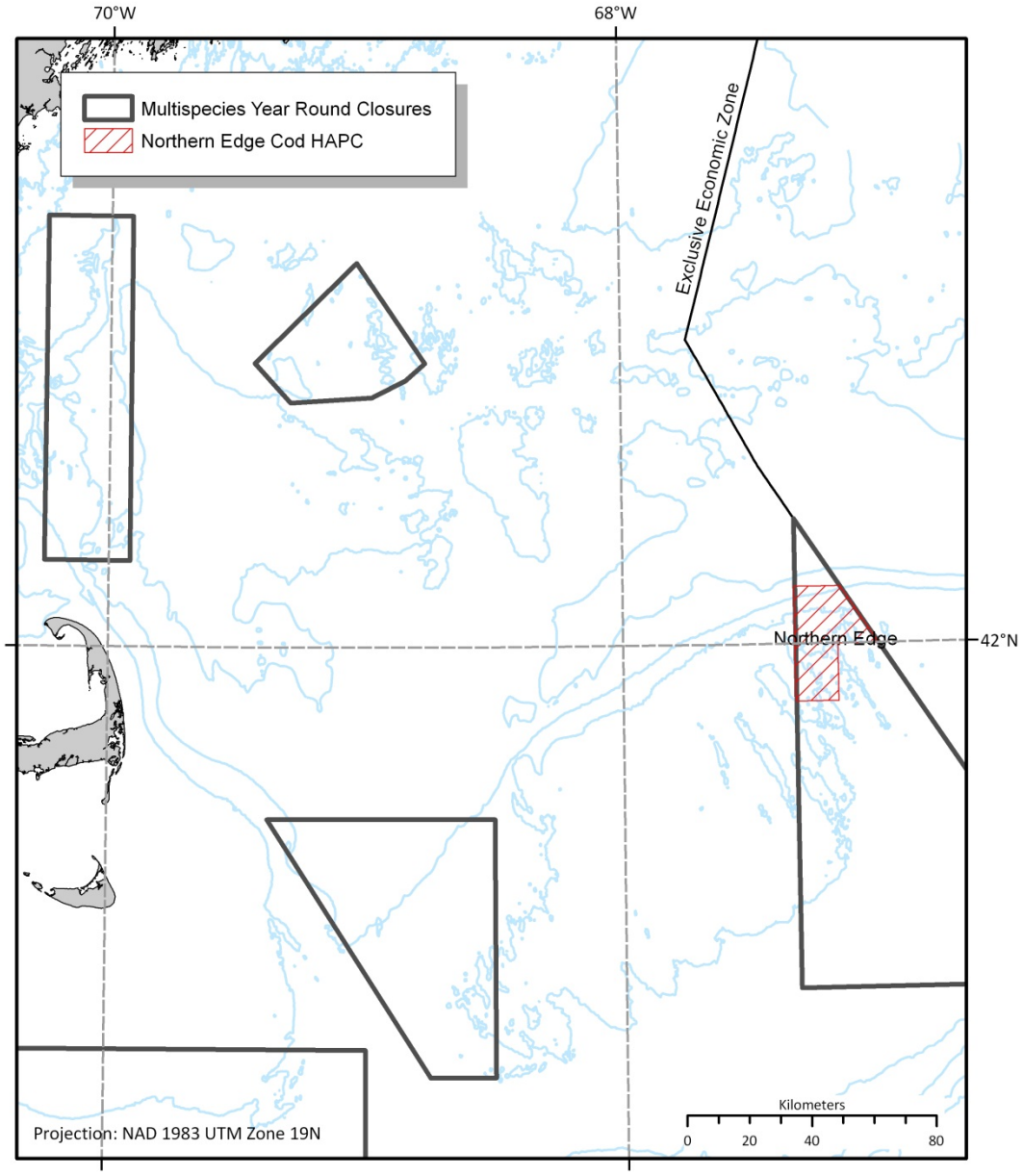
Table 21 – Northern Edge Geoges Bank Juvenile Cod HAPC: summary of alignment with HAPC criteria from both the EFH Final Rule and the Council

Criteria or preference	*Criteria or preference met?*	*Discussion*

Criteria or preference	*Criteria or preference met?*	*Discussion*
Importance of Historic or Current Ecological Function (EFH Final Rule criteria)	Yes	Specific areas on the northern edge of Georges Bank have been extensively studied and identified as important areas for the survival of juvenile cod (Lough et al. 1989; Valentine and Lough 1991; Valentine and Schmuck 1995). These studies provide reliable information on the location of the areas most important to juvenile cod and the type of substrate found in those areas. Several sources document the importance of gravel/cobble substrate to the survival of newly settled juvenile cod (Lough et al. 1989; Valentine and Lough 1991; Gotceitas and Brown 1993; Tupper and Boutilier 1995; Valentine and Schmuck 1995). A substrate of gravel or cobble allows sufficient space for newly settled juvenile cod to find shelter and avoid predation (Lough et al. 1989; Valentine and Lough 1991; Gotceitas and Brown 1993; Tupper and Boutilier 1995; Valentine and Schmuck 1995). Particular life history stages or transitions are sometimes considered "ecological bottlenecks" if there are extremely high levels of mortality associated with the life history stage or transition. Extremely high mortality rates attendant to post-settlement juvenile cod are attributed to high levels of predation (Tupper and Boutilier 1995). Increasing the availability of suitable habitat for post-settlement juvenile cod could ease the bottleneck, increasing juvenile survivorship and recruitment into the fishery. Collie et al. (1997) describe the relative abundance of several other species such as shrimps, polychaetes, brittle stars, and mussels in unfished sites within the HAPC. These species are found in association with the emergent epifauna (bryozoans, hydroids, tube worms) prevalent in the area. Several studies of the food habits of juvenile cod identify these associated species as important prey items (Hacunda 1981; Lilly and Parsons 1991; Witman and Sebens 1992; Casas and Paz 1994; NEFSC 1998). Thus, the area provides two important ecological functions for post-settlement juvenile cod relative to other areas: increased survivability and readily available prey.
Sensitivity to Anthropogenic Stresses (EFH Final Rule criteria)	Yes	Gravel/cobble areas on the northern edge of Georges Bank have been studied to determine the effects of bottom fishing on the benthic megafauna (Collie et al. 1996; Collie et al. 1997). Gravel/cobble substrates not subject to fishing pressure support thick colonies of emergent epifauna, but bottom fishing, especially scallop dredging, reduces habitat complexity and removes much of the emergent epifauna (Collie et al. 1996; Collie et al. 1997). While acknowledging that a single tow of a dredge across pristine habitat will have few long-term effects, Collie et al. (1997) focuses on the cumulative effects and intensity of trawling and dredging as responsible for potential long-term changes in benthic communities.
Extent of Current or Future Development Stresses (EFH Final Rule criteria)	No	This criterion was not used as a justification for the status quo HAPC on George's Bank in the 1998 EFH Omnibus Amendment #1.
Rarity of the	No	This criterion was not used as a justification for the status quo HAPC on

Criteria or preference	*Criteria or preference met?*	*Discussion*
Habitat Type (EFH Final Rule criteria)		George's Bank in the 1998 EFH Omnibus Amendment #1.
Will improve the fisheries management in the EEZ (Council preference)	Yes	Area provides two important ecological functions for post-settlement juvenile cod, an overfished species, relative to other areas: increased survivability and readily available prey.
Include EFH designations for more than one Council-managed species (Council preference)	No	N/A
Include juvenile cod EFH (Council preference)	Yes	HAPC designed specifically to capture juvenile cod habitats.
Meet more than one of the EFH Final Rule HAPC criteria (Council preference)	Yes	Meets Criteria 1 and Criteria 2

Map 77 – Northern Edge Juvenile Cod HAPC



2.3 Inshore Juvenile Cod HAPC (approved in Phase 1)

This approved HAPC includes the inshore areas of the Gulf of Maine and Southern New England. The purpose of this HAPC was to recognize the importance of inshore areas to juvenile Atlantic cod. In 1999, the Council voted to approve this alternative and include it in the next appropriate fishery management plan amendment. The Habitat Plan Development Team advised the Habitat Committeed to include two options for public comment in the Phase 1 DEIS: Option A: 0-10 meters Mean Lowest Low Water (MLLW), and Option B: 0-20 meters MLLW. The Council selected Option B, which covers 2,596 nm^2.

Table 22 – Summary of EFH Final Rule HAPC Criteria and Council Preferences for Inshore Juvenile Cod HAPC.

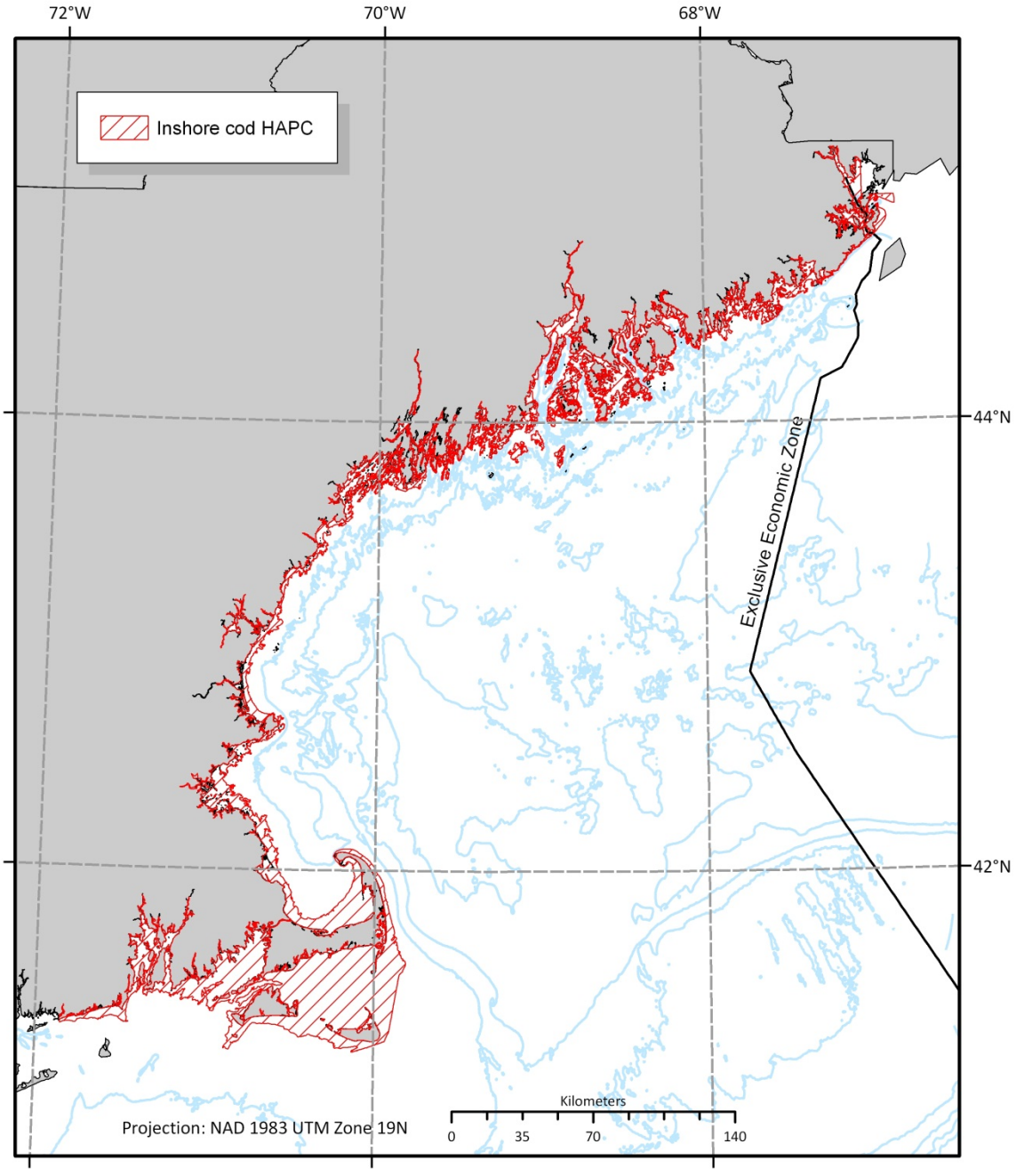
Criteria or preference	*Criteria or Preference Met?*	*Discussion*
Importance of Historic or Current Ecological Function (EFH Final Rule criteria)	Yes	These areas proposed for juvenile cod HAPC designation contain structurally complex rocky-bottom habitat that supports a wide variety of emergent epifauna and benthic invertebrates. This habitat type provides two key ecological functions for juvenile cod: increased survivorship and readily available prey.
Sensitivity to Anthropogenic Stresses (EFH Final Rule criteria)	Yes	Due to their close proximity to human activities, inshore and nearshore areas are sensitive to anthropogenic stresses. Table 25 below describes eight types of potential chemical threats, 19 categories of potential physical threats and four types of potential biological threats to the four life history stages of Atlantic cod EFH, which are categorized as low, moderate or high threats (L, M and H, respectively) based on their geographic location (inshore and offshore). Some types and categories of potential chemical, physical and biological threats were unable to be characterized for this document and were assigned "U" (unknown). The categories were modified from a table in Amendment 13 to the Northeast Multispecies FMP developed by the New England Fishery Management Council (NEFMC 2003a). In general, the closer the proximity to the coast (i.e., close to pollution sources and habitat alterations) the greater the potential for impact.
Extent of Current or Future Development Stresses (EFH Final Rule criteria)	Yes	The area faces existing and on-going development-related threats and planned or foreseeable development-related threat. Development-related threats may result from, but are not limited to, chemical, physical and biological impacts from the anthropogenic sources listed in Table 25.
Rarity of the Habitat Type (EFH Final Rule criteria)	No	This HAPC does not meet this criterion.
Will improve the fisheries management in the EEZ (Council preference)	Yes	Recognition of the importance of critical inshore habitats which provide habitat for cod from settlement through the first autumn of life and overlaps seasonal habitat of age-1 juvenile cod. The area also bounds the critical nursery zone for early benthic stages of important juvenile habitat for some other groundfish.
Include EFH designations for more than one Council-managed species (Council preference)	Yes	
Include juvenile cod EFH (Council preference)	Yes	Between 44% and 94% of the area includes juvenile cod depending on the option chosen and the EFH categories (no action or preferred alternative).
Meet more than one	Yes	Meets 3 of the criteria.

Criteria or preference	*Criteria or Preference Met?*	*Discussion*
of the EFH Final Rule HAPC criteria (Council preference)		

Table 23 – Summary of potential inshore of various non-fishing activities to Atlantic cod EFH by lifestage. Key: H = high, M = moderate, L = low, and U = unknown.

Potential Threats	*Type*	*Eggs*	*Larvae*	*Juveniles*	*Adults*
PAH	Chemical	M	M	M	M
PCB	Chemical	M	M	M	M
Heavy Metals	Chemical	M	M	M	M
Nutrients	Chemical	M	M	M	M
Pesticides/Herbicides	Chemical	U	U	U	U
Acid	Chemical	M	M	M	L
Chlorine	Chemical	M	M	M	M
Greenhouse Gases	Chemical	U	U	U	U
Channel Dredging	Physical	M	M	M	M
Dredge and Fill	Physical	M	M	M	M
Dredge Material Disposal	Physical	H	M	M	M
Marina/Docks	Physical	M	M	M	L
Vessel Operation	Physical	M	L	L	L
Utility Lines/Pipelines	Physical	U	U	U	U
Oil/Gas Operations	Physical	M	M	M	M
Erosion/Flood Control Structures	Physical	U	U	U	U
Road Building/Maintenance	Physical	U	U	U	U
Dam Construction/Operation	Physical	U	U	U	U
Agriculture/Silviculture	Physical	U	U	U	U
Water Intake	Physical	M	M	L	L
Water Discharge	Physical	L	M	M	M
Sewage/Septic Discharge	Physical	M	M	M	M
Marine Mining	Physical	M	L	L	L
Salinity	Physical	L	L	L	L
Suspended Particles	Physical	M	M	M	L
Thermal	Physical	M	M	M	L
Dissolved Oxygen	Physical	M	M	M	M
Exotic Species	Biological	U	U	U	U
Pathogens	Biological	U	U	U	U
Aquaculture Operations	Biological	U	U	U	U
Plankton Blooms	Biological	U	U	U	U

Map 78 – Inshore Juvenile Cod HAPC



2.4 Great South Channel Juvenile Cod HAPC (approved in Phase 1)

The Great South Channel is a large funnel-shaped bathymetric feature at the southern extreme of the Gulf of Maine between Georges Bank and Cape Cod, MA. The channel is bordered on the west by Cape Cod and Nantucket Shoals, and on the east by Georges Bank. The channel is generally deeper to the north and shallower to the south, where it narrows and rises to the continental shelf edge. To the north, the channel opens into

several deepwater basins of the Gulf of Maine. The V-shaped 100-m isobath effectively delineates the steep drop-off from Nantucket Shoals and Georges Bank to the deeper basins.

The Great South Channel separates the main part of Georges Bank from Nantucket Shoals. Sediments in this region include gravel pavement and mounds, some scattered boulders, sand with storm generated ripples, scattered shell and mussel beds. Tidal and storm currents may range from moderate to strong, depending upon location and storm activity. The area west of the Great South Channel, known as Nantucket shoals is similar in nature to the central region of the bank. Currents in these areas are strongest where water depth is shallower than 50 m. The channel separates the western part of Georges Bank from Nantucket Shoals and is a region of high productivity due to an oceanic frontal system formed by the interaction of the Gulf of Maine and continental shelf waters and strong tidal currents.

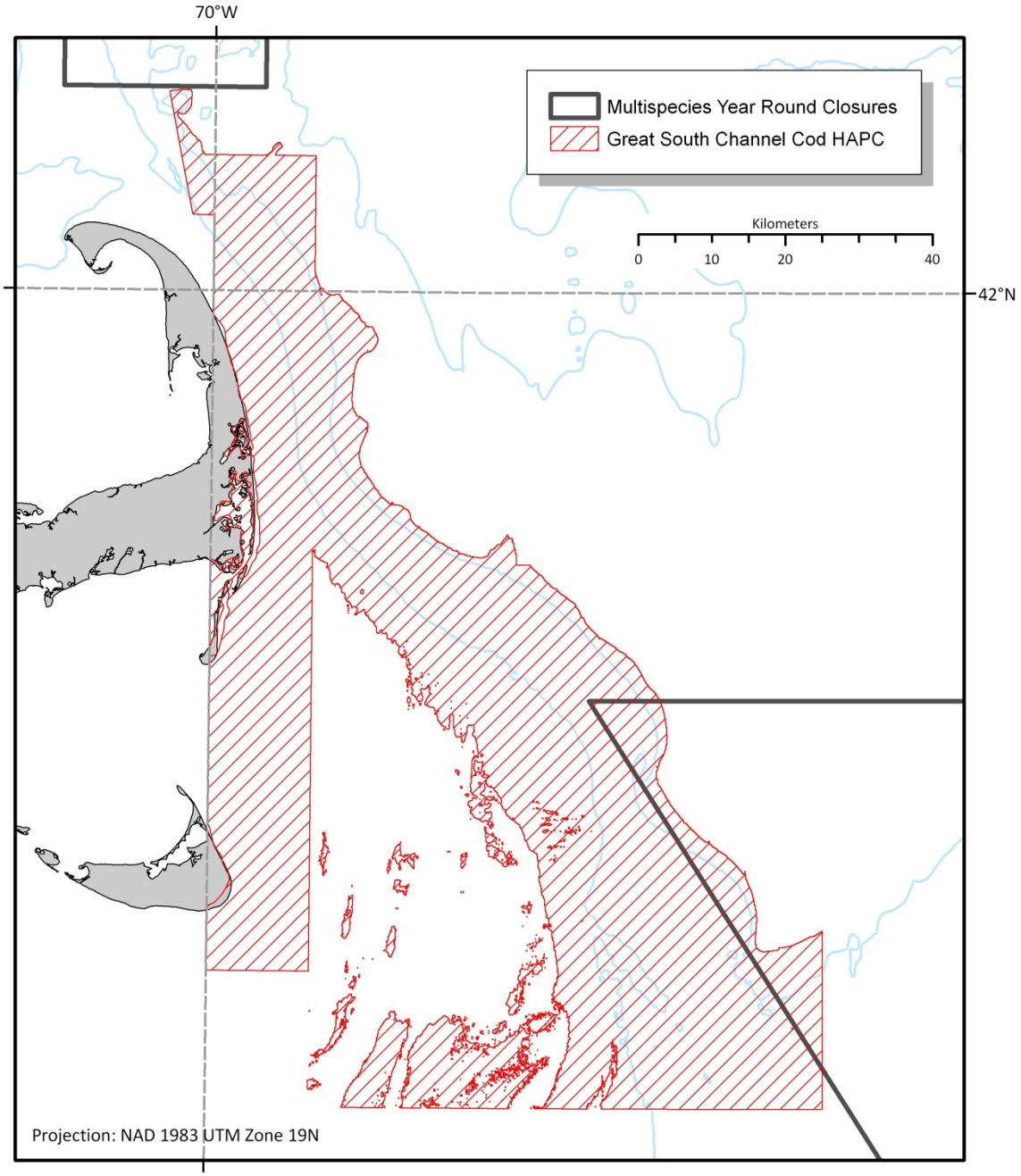
The purpose of this HAPC is to recognize the importance of the area for its high benthic productivity and hard bottom habitats, which provide structured benthic habitat and food resources for cod and other demersal-managed species. The proposed designation is 4,537 nm^2 in area.

Table 24 – Summary of HAPC Final Rule Criteria and Council Preferences as applied to Great South Channel Juvenile Cod HAPC

Criteria or preference	*Criteria or preference met?*	*Discussion*
Importance of Historic or Current Ecological Function (EFH Final Rule criteria)	Yes	This area contains structurally complex gravel, cobble, and boulder habitat, which supports a wide array of emergent epifauna that juvenile cod rely on for food and shelter from predation. Within the area, many different types of habitats exist that are important to juvenile cod. Deep-water locations (45 - 75 fathoms) have hard bottom with glacially deposited boulders that are fished for groundfish and include a greater diversity of species than shallow areas. Common fishing area names in this region include: (1) East Southeast Ridge; (2) Figs; (3) Jim Dwyers Ridge; (4) The Sixty-sixes; and (5) Pimple Ridges. Shallower-water locations (15 - 40 fathoms) have rock and gravel with benthic organisms such as horse mussels, tunicates, and sponges. Common fishing area names in this area include: (1) Lemons and (2) Mussels; (3) Crushed Shells; (4) East of Pollock Hole; (5) Codfish Grounds; (6) Big Mussels Cove; (7) Middle Rip; and (8) Pumpkins.
Sensitivity to Anthropogenic Stresses (EFH Final Rule criteria)	Yes	The area contains habitat features that are particularly sensitive to the adverse effects associated with bottom trawling and scallop dredging.
Extent of Current or Future Development	Yes	The area faces threats from bottom trawling and scallop dredging, both of which occur throughout the area. Bottom trawling is also extensive throughout juvenile cod EFH in areas west of the Great

Criteria or preference	*Criteria or preference met?*	*Discussion*
Stresses (EFH Final Rule criteria)		South Channel and in gravel habitats on Georges Bank.
Rarity of the Habitat Type (EFH Final Rule criteria)	Yes	Habitat type is rare in NE??
Will improve the fisheries management in the EEZ (Council preference)	Yes	Could improve understanding of importance of structurally complex areas for future fishery produvity.
Include EFH designations for more than one Council-managed species (Council preference)	Yes	Includes 80 life stages under the status quo EFH and 64 life stages under the preferred alternative EFH.
Include juvenile cod EFH (Council preference)	Yes	63% of the area is EFH for juvenile cod under status quo EFH and 47% of the areas is designated EFH for juvenile cod under the preferred alternative EFH. 90% of the area is EFH under adult cod under status quo EFH and 53% of the areas is designated EFH for adult cod under preferred alternative EFH.
Meet more than one of the EFH Final Rule HAPC criteria (Council preference)	Yes	Meets all criteria.

Map 79 – Great South Channel Juvenile Cod HAPC



2.5 Cashes Ledge Area HAPC (approved in Phase 1)

Cashes Ledge is a granitic ridge located in the central Gulf of Maine which, including Ammen Rock Pinnacle, rises to within 26 meters of the ocean surface. The top of Cashes Ledge is primarily a steeply sided granitic outcrop that grades to boulder-talus-ledge, then cobble-sand and small outcrops, and finally sand-gravel as depth increases beyond approximately 75 m. The 652-nm^2 Cashes Ledge HAPC encompasses areas outside of

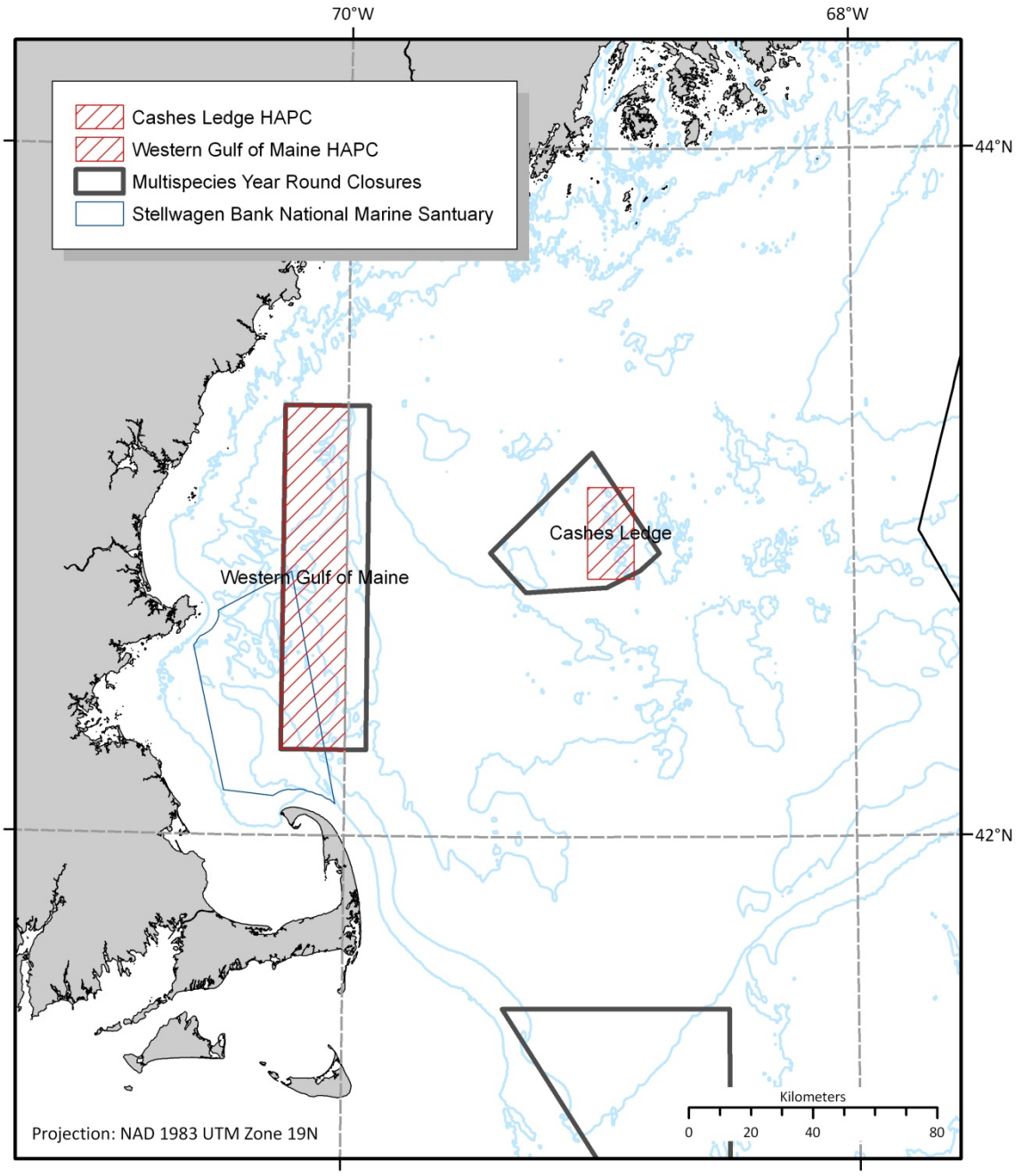
the Cashes Ledge Habitat Closed Area in order to include deeper water habitats and ridges associated with Cashes Ledge.

Table 25 – Suitability of proposed Cashes Ledge HAPC

Criteria or preference	*Criteria Met?*	*Discussion*
Importance of Historic or Current Ecological Function (EFH Final Rule criteria)	Yes	Several unique features contribute to the ecological importance of the Cashes Ledge area. Productivity in the Cashes Ledge area is noteworthy because the area generates and receives internal waves that drive thick, plankton-rich layers down to the ledge (Witman et al. 1993). Dense aggregations of habitat forming invertebrates such as horse mussels, sea anemones, and sponges thrive on the productivity of the area and flourish along many of the peaks that distinguish the area (Witman and Sebens 1988, Lesser et al. 1994, Genovese and Witman, 1999, Hill et al. 2002) while burrowing anemones are abundant in the sand-gravel matrix beyond the base (Witman and Sebens 1988). Further, production of benthic macroalgae on Ammen Rock Pinnacle occurs at a record 63 m depth. The Cashes Ledge area continues to support a high abundance of large bodied predators such as cod, wolf fish, pollock, and sharks (Steneck 1997, Steneck and Carlton 2001, Steneck et al 2002, Witman and Sebens 1992) that are generally absent from rocky habitats along the coast of the Gulf of Maine. Fish may aggregate or have higher survival after settlement in the Cashes Ledge area due to increased availability of shelter (e.g., kelp forests, structure forming invertebrates) and abundant prey mediated by high water flow from nutrient-rich internal waves and other strong-current producing forces (Witman et al. 1993, Leichter and Witman 1997, Genovese and Witman 1999).
Sensitivity to Anthropogenic Stresses (EFH Final Rule criteria)	Yes	Benthic habitat features are sensitive to anthropogenic stresses, including impacts caused by fishing gear
Extent of Current or Future Development Stresses (EFH Final Rule criteria)	Yes	The greatest potential threat to the unique habitat features contained in the proposed Cashes Ledge HAPC is impacts caused by fishing gear. Currently, a portion of the area is designated as a habitat closed area, which prohibits the use of bottom-tending mobile gear. However, the designation does not prohibit the use of a wide array of other fishing gears, including but not limited to: 1) herring and tuna purse seines, 2) herring mid-water trawls, 3) bottom gillnets, 4) lobster pots, and 5) bottom longlines.
Rarity of the Habitat Type (EFH Final Rule criteria)	Yes	The Cashes Ledge Area is a series of rocky pinnacles jutting up from the deep basins in the middle of the Gulf of Maine. Upwelling and internal waves deliver fish and invertebrate larvae to these pinnacles where settlement occurs. The combination of sunlight and nutrient-rich waters fuels the growth of these larvae creating a productive area that supports one of the largest kelp forests and deepest seaweed

Criteria or preference	*Criteria Met?*	*Discussion*
		communities in the world, as well as abundant populations of large predatory fish including cod, pollock, wolf fish, and sharks. These unique conditions are found nowhere else in the greater Gulf of Maine/Georges Bank ecosystem, clearly making the Cashes Ledge area a rare habitat type.
Will improve the fisheries management in the EEZ (Council preference)	Yes	
Include EFH designations for more than one Council-managed species (Council preference)	Yes	
Include juvenile cod EFH (Council preference)	No	Includes adult cod.
Meet more than one of the EFH Final Rule HAPC criteria (Council preference)	Yes	Meets all four criteria.

Map 80 – Gulf of Maine HAPCs, including Cashes Ledge HAPC and Jeffrey's Ledge/Stellwagen Bank HAPC



2.6 Jeffrey's Ledge/Stellwagen Bank HAPC (approved in Phase 1)

Three options were proposed during Phase 1 to designate an HAPC in and around Jeffrey's Ledge/Stellwagen Bank. The alternative chosen by the Council (see Map 80) is the same as the Western Gulf of Maine Habitat Closure Area designated in Amendment 13 to the Multispecies FMP.

Rationale: ***Importance of Historic or Current Ecological Function:***

Table 26 – Summary of EFH Final Rule Criteria and Council preferences for the Stellwagen Bank-Jeffrey's Ledge proposed HAPC

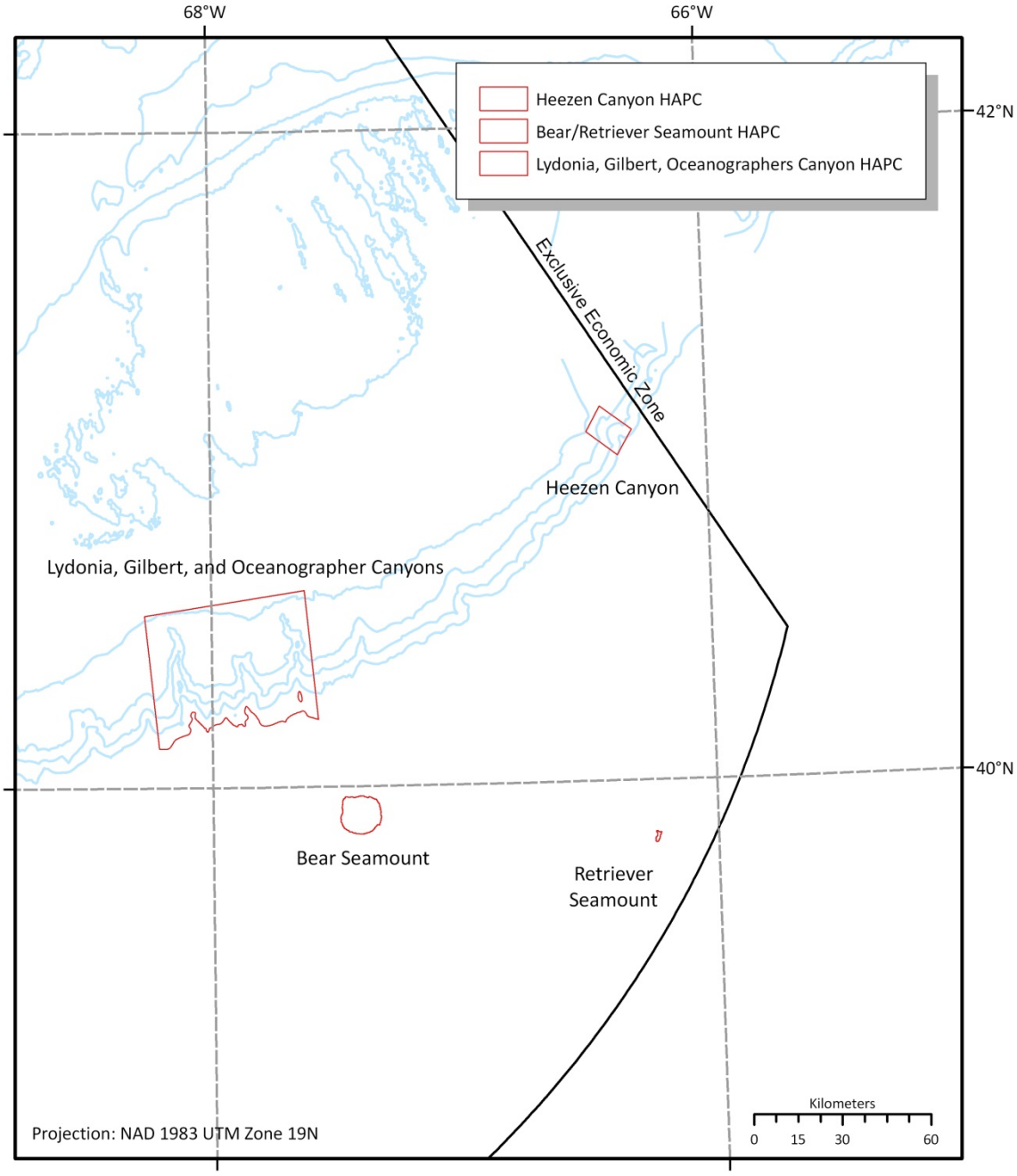
Criteria or preference	Criteria Met?	Discussion
Importance of Historic or Current Ecological Function (EFH Final Rule criteria)	Yes	The important ecological functions known to occur with the area have been recognized for over a century. Captain Henry Stellwagen first described the Stellwagen Bank area in 1854 as a 15 fathom bank characterized by a rocky substrate on the northern flank, sand features in the middle and southern end, and deeper mud basins just inshore of the bank itself. After the turn of the century, the report entitled Fishing Grounds of the Gulf of Maine identified both Jeffreys Ledge and Stellwagen Bank (or Middle Bank) as key fishing grounds. Jeffreys was known to contain rocky bottom in the shoaler water with gravel and pebbles along the edges. It was considered one of the best fishing grounds in the Gulf of Maine with cod, haddock, pollock, cusk, hake, flounder, herring, and mackerel all found in the area. Stellwagen and Tillies Banks were also identified as important fishing grounds with cod, haddock, pollock, cusk, and hake all present during times of the year (Rich, 1929). Additionally, the area has been recognized as a preferred habitat for several marine mammal species and seabirds for decades. Jeffreys Ledge and Stellwagen Bank are shallow, glacially formed features that include a diversity of habitat types, including gravel/cobble substrates, boulder reefs, sand plains, and deep mud basins in a complex matrix. Oceanographic currents driven by the Gulf of Maine Coastal Current as well as from the impingement of internal waves deliver nutrient-rich waters to the area and the topographic features of the area result in upwelling that drives production. The complex matrix of sedimentary habitats supports a wide diversity of structure forming invertebrates including frilled anemones, burrowing anemones, sponges, bryozoans, ascidians, cold water corals (Auster et al. 1998, Grannis 2001). Such habitats are important areas for recruitment and survival of species such as cod, haddock, cusk, Acadian redfish, silver hake and a diversity of flounders (e.g., Auster et al. 2001, 2003a and 2003b). Further, the Jeffreys Ledge-Stellwagen Bank area supports a high diversity of fishes compared to many other areas in the Gulf (Auster 2002).
Sensitivity to Anthropogenic Stresses (EFH Final Rule criteria)	Yes	The unique habitat features and ecological processes within the area re also vulnerable to a number of other anthropogenic stresses, including but not limited to: 1) alteration of ecological processes resulting from nutrient and chemical pollution caused by cruise ships and cargo vessel discharges, sewage discharges from coastal communities including the city of Boston's municipal wastewater discharge, and terrestrial non-point source pollution, and 2) habitat alteration and disturbance of benthic communities caused by future sand and gravel mining operations, waste disposal, construction of fiber-optic cable and pipelines, and potential new industrial uses of the coastal waters and the seabed including offshore aquaculture facilities, wind energy, LNG facilities, and other energy-related infrastructure.
Extent of Current or Future	Yes	Fishing threats: considerable commercial and recreational fishing effort in the proposed area. Non-fishing threats: 1) vessel discharges (ballast and gray water) from cruise ships and cargo vessels, 2) future sand and gravel

Criteria or preference	Criteria Met?	Discussion
Development Stresses (EFH Final Rule criteria)		mining operations, 3) sewage discharges from coastal communities including the city of Boston's municipal wastewater discharge, 4) terrestrial non-point source pollution, 5) other waste disposal operations, 6) fiber-optic cable and pipeline construction, and 7) potential new industrial uses of the coastal waters and seabed including offshore aquaculture facilities, wind energy, LNG facilities, and other energy-related infrastructure.
Rarity of the Habitat Type (EFH Final Rule criteria)	Yes	Unique aspects of the habitats contained within the area include their extreme depth range, which bathes these features in Maine Surface and Intermediate Waters, as well as the fact that they represent the wide diversity of habitat types in the Gulf of Maine in a discrete location.
Will improve the fisheries management in the EEZ (Council preference)	Yes	Recognition of habitats that are 1.) important areas for recruitment and survival of species such as cod, haddock, cusk, Acadian redfish, silver hake and a diversity of flounders and 2.) support a high diversity of fishes compared to many other areas in the Gulf of Maine.
Include EFH designations for more than one Council-managed species (Council preference)	Yes	Includes EFH for between 40 and 67 life stages depending on the option chosen and the EFH categories (no action or preferred alternative)
Include juvenile cod EFH (Council preference)	Yes	Between 55% and 100% of the area includes juvenile cod depending on the option chosen and the EFH categories (no action or preferred alternative).
Meet more than one of the EFH Final Rule HAPC criteria (Council preference)	Yes	Meets all of the criteria.

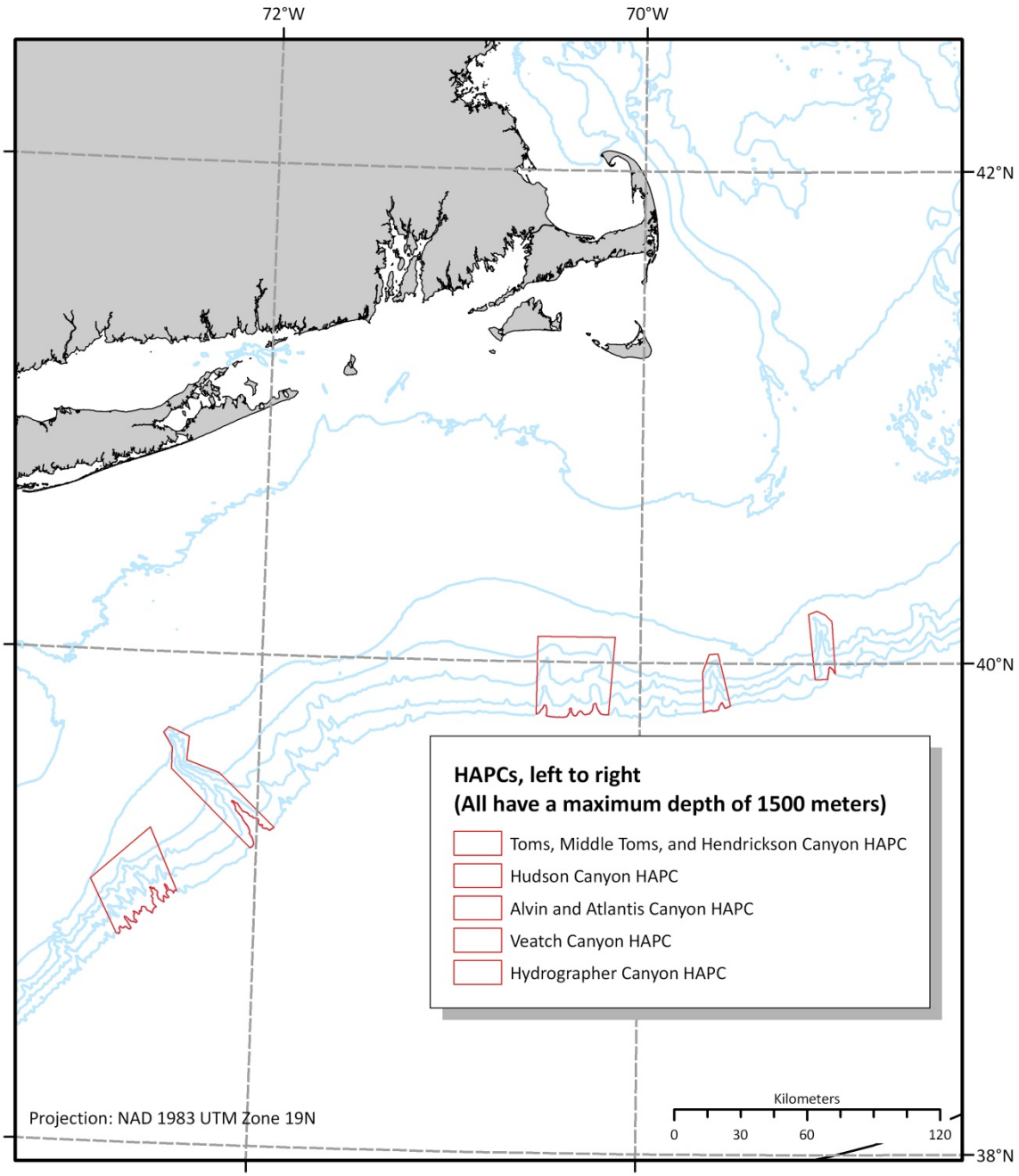
2.7 Deepwater canyon and seamount HAPCs (approved in Phase 1)

Various deepwater areas in the EEZ were proposed as candidates for HAPC designation in Phase 1, and a number of these proposals were subsequently approved by the Council. The boundaries of the selected HAPCs are illustrated on Map 81, Map 82, and Map 83.

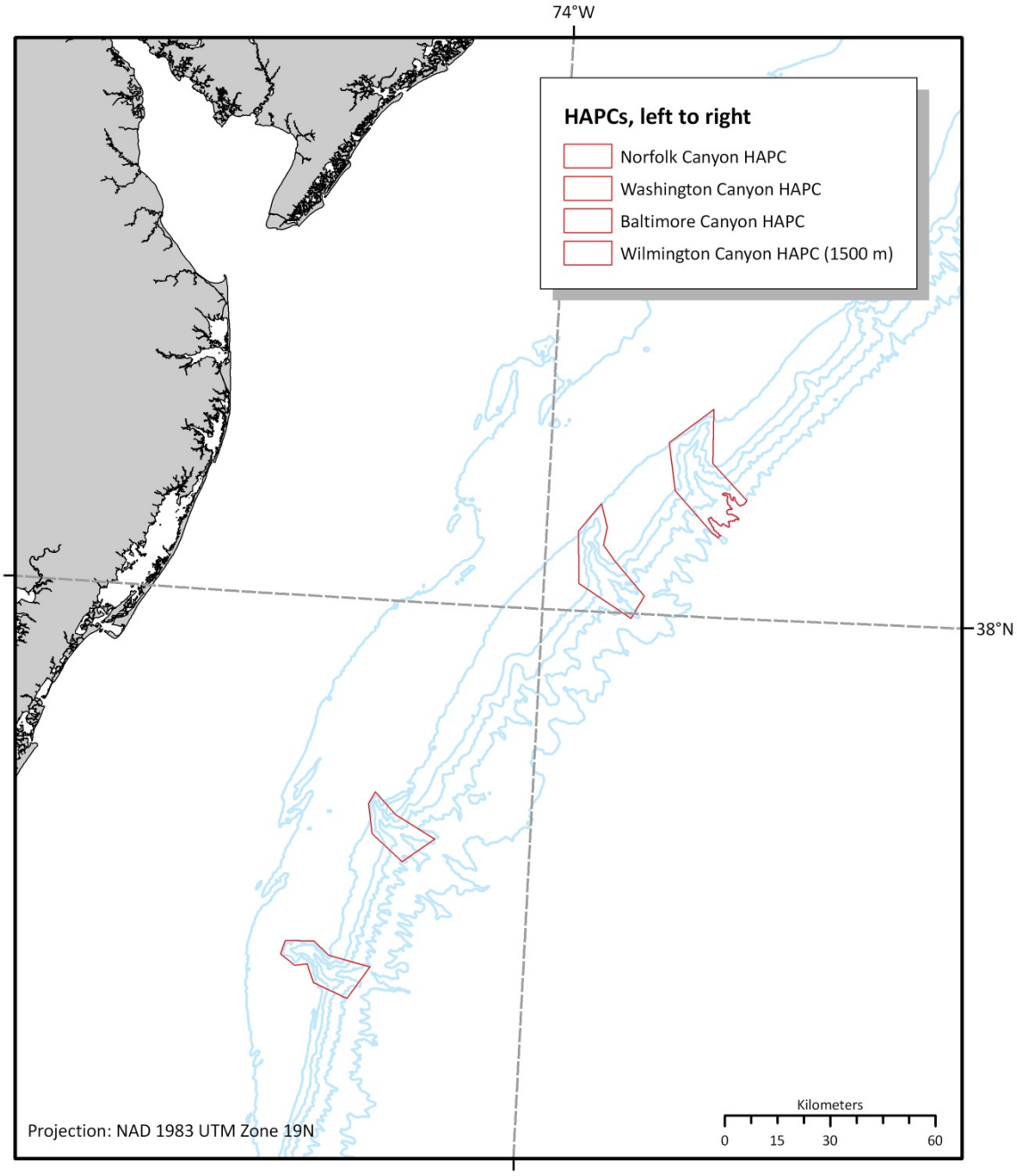
Map 81 – Georges Bank area HAPCs, including Bear and Retriever Seamounts with identifiable EFH HAPC (to 2000 m), Heezen Canyon HAPC, Lydonia/Gilbert/Oceanographers Canyon HAPC (to 1500 m)



Map 82 – Toms/Middle Toms, and Hendrickson Canyon HAPC; Hudson Canyon HAPC; Alvin and Atlantis Canyon HAPC; Veatch Canyon HAPC; and Hydrographer Canyon HAPC



Map 83 – Norfolk Canyon HAPC, Washington Canyon HAPC, Baltimore Canyon HAPC, and Wilmington Canyon HAPC



2.7.1 Bear and Retriever Seamounts with identifiable EFH HAPC (approved in Phase 1)

The New England Seamount chain is a line of extinct volcanoes running from the southern side of Georges Bank to a point midway across the western Atlantic. The New England Seamount Chain, the Corner Rise Seamounts, the mid-Atlantic Ridge, and the

deep sides of the Azores constitute a nearly continuous series of hard substrate "islands" in a sea of abyssal mud extending across the North Atlantic Ocean. These islands are therefore rare habitats within the context of the whole North Atlantic basin. The most westerly seamounts (i.e., Bear, Physalia, Retriever, and Mytilus) are within the boundary of the United States Exclusive Economic Zone. Although these seamounts are further offshore than the shelf edge and slope, and are not within areas traditionally managed by current FMPs, they are within the EEZ and deep-sea red crab have been document in the areas. Areas of Bear and Retriever seamounts that overlapped spatially with the proposed EFH designation for deep-sea red crab were approved as an HAPC (see Map 81). These include areas of the seamounts shallower than 2000 m.

Table 27 – Suitability of Bear and Retriever Seamounts with indentifiable EFH proposed HAPC

Criteria or preference	*Criteria Met?*	*Discussion*
Importance of Historic or Current Ecological Function (EFH Final Rule criteria)	Yes	May provide "stepping stones" for dispersal and maintenance of populations of deepwater demersal fishes across ocean basins where their vertical distributions are restricted to slope depths
Sensitivity to Anthropogenic Stresses (EFH Final Rule criteria)	Yes	The seamount habitats, which contain structure-forming organisms such as deep-sea corals, are extremely sensitive to disturbance and likely have recovery periods on the order of centuries. However, these seamounts are not currently fished.
Extent of Current or Future Development Stresses (EFH Final Rule criteria)	No	No development is currently occurring on the New England Seamount Chain and it is unknown whether any will take place in the future. As such, the HAPC alternative does not meet this criterion.
Rarity of the Habitat Type (EFH Final Rule criteria)	Yes	Seamounts have steep and complex topography, impinging currents with topographically induced upwellings, wide depth ranges, are dominated by hard substrates, are geographically isolated from continental platforms, and are dominated by invertebrate suspension feeders. Seamount faunas generally exhibit a high degree of endemism, owing to their isolation as well as the high degree of landscape variation at small and large spatial scales.
Will improve the fisheries management in the EEZ (Council preference)	Yes	An opportunity to recognize sensitive coral communities with no impact to current economic investments by the fishing industry.
Include EFH designations for more than one Council-managed species (Council preference)	No	N/A

Criteria or preference	*Criteria Met?*	*Discussion*
Include juvenile cod EFH (Council preference)	No	N/A
Meet more than one of the EFH Final Rule HAPC criteria (Council preference)	Yes	

2.7.2 Canyon HAPCs (approved in Phase 1)

The continental slope extends from the continental shelf break (at depths between 60 m and 200 m) eastward to a depth of 2000 m. It is cut by more than 20 large canyons between Georges Bank and Cape Hatteras, and numerous smaller canyons and gullies, many of which may feed into the larger canyon systems. The width of the slope varies from 10-50 km, with an average gradient of 3-6°; however, local gradients can be nearly vertical. The base of the slope, where the continental rise begins, is defined by a marked decrease in seafloor gradient. Occasional boulders occur on the slope as a result of glacial rafting, and coarse sediments and rock outcrops are found locally on and near canyon walls. Sand deposits may also be formed as a result of downslope movements. A "mud line" occurs on the slope at a depth of 250 m – 300 m, below which fine silt and clay size particles predominate over sand. Gravity-induced downslope movement is the dominant sedimentary process on the slope, and includes slumps, slides, debris flows, and turbidity currents, which range from thick cohesive movement to relatively non-viscous flow. Slumps are localized blocks of sediment that may involve short downslope movement. However, turbidity currents can transport sediments thousands of kilometers.

The following HAPCs were approved during Phase 1. Boundaries are illustrated on Map 81, Map 82, and Map 83. Following initial Council approval, those HAPCs indicated with an asterisk (*) below were limited to 1500 m depth, which is the maximum depth to which continental slope EFH designations extend.

The main purpose of the individual canyon HAPC alternatives is to designate as HAPC deep-sea canyons in the northeastern U.S. that contain or are believed to contain habitat-forming organisms including, but not limited to, stony corals (Sceractinians), black corals (Anthipitharians), cerianthid anemones, soft corals, sea pens and sponges. Recognizing the importance of these species and their communities will be a first step towards maintaining the vital functions they provide for managed fish species, of which there is some evidence but also a clear need for further research.

- Lydonia/Gilbert/Oceanographers Canyons HAPC*
- Hydrographer Canyon HAPC*

- Veatch Canyon HAPC*
- Alvin/Atlantis Canyon HAPC*
- Hudson Canyon HAPC*
- Toms/Middle Toms/Hendrickson Area HAPC*
- Wilmington Canyon HAPC*
- Baltimore Canyon HAPC
- Washington Canyon HAPC
- Norfolk Canyon HAPC

Table 28 – Summary of Alternative 3 Suitability: HAPC Criteria and Council Preferences

Criteria or preference	*Criteria or preference met?*	*Discussion*
Importance of Historic or Current Ecological Function (EFH Final Rule criteria)	Yes	With respect to fisheries management and habitat protection, at least eight invertebrate groups found in deep-sea canyon environments contain species that potentially provide structures that form habitats for other marine organisms in deep water off the northeast coast of the United States. The largest and most studied Georges Bank canyon is Oceanographer Canyon, and its surficial geology is generally similar to that in the other major canyons. The canyons present a spectrum of habitat types to the megabenthic and epibenthic fauna (crabs, lobster, shrimp, flounders, hake, tilefish, among others), and these habitats closely influence community structure. It is largely the diversity in substrate types that makes canyons richer biologically than the adjacent shelf and slope. This effect of substrate diversity may be aided by an abundance of nutrients introduced by the relatively strong currents in the canyons (Hecker, Blechschmidt, and Gibson, 1980). The Georges Bank canyons apparently serve as nurseries for a number of bottom animals, including such commercially valuable species as lobster, Jonah crab, red crab, tilefish, and several kinds of hake. The young of such animals have been observed both in naturally occurring and in excavated shelters in the bottom, in both the semi-consolidated sandy silts (which look like clay) and in boulder fields. Such substrates are common in the canyons (Cooper and Uzmann, 1980 a,b). Concentrations of lobsters (juvenile and adult), for example, are substantially greater in submarine canyons than in areas nearby (Cooper and Uzmann, 1980b); lobsters seen inside the canyons are usually juveniles, while those nearby but outside the canyons are usually adults. In general, assemblages of animals in the heads of various Georges Bank canyons are similar. Within these assemblages, groups that favor shallow and middle depths can be distinguished. The distinction is most clearly seen in the

Criteria or preference	*Criteria or preference met?*	*Discussion*
		relative abundance of red crabs, portunid crabs, lobsters, witch flounder, ocean pout, conger eels, tilefish, squirrel hake, common grenadier, slime eels, long-nosed eels, and black-bellied rosefish. An outer shelf/upper slope faunal zone (113-299m) and a mid-slope zone (300-1099m) were found by Haedrich, Rowe, and Polloni (1975) in Alvin Canyon and by Valentine, Uzmann, and Cooper (1980a) in Oceanographer Canyon. Further evidence for this zonation in Oceanographer and Lydonia Canyon has come from Hecker (pers. comm.). Faunal diversity and, to some extent faunal abundance, in the canyon heads appear to be closely tied to the presence of cobbles and boulders on the ocean floor and to exposures of the consolidated sandy silt into which various animals tunnel and burrow. Georges Bank canyons exhibit a range of habitat types, as follows: • Type I habitat (Cooper et al. 1982) which occurs on the canyon rim and walls, is a featureless bottom of sand or semi-consolidated silt (claylike in consistency) with less than 5% gravel cover; a burrowing anemone characterizes this habitat. • Type II habitat is also a generally featureless bottom, of gravelly sand with at least 5% gravel cover overlying a silt substratum on the canyon rim and walls. The burrowing anemone is again characteristic – a key member of what is probably the most common association of animals in the Georges Bank canyons in depths shoaler than 400m. The tubes frequently become refuges for a variety of associated fauna, including Jonah crabs, portunid crabs, lobsters, pandalid shrimp, black-bellied rosefish, redfish, and red and silver hake. The surface of the projecting tubes also provides a consolidated surface for settlement and attachment of suspension feeders, contributing to an increased species diversity and abundance (Shepard et al. 1986). • Type III habitat refers to featured, three-dimensional, very rough bottom, with siltstone outcrops and talus blocks of boulder size. These conditions are found on the rim and upper walls at the head of Oceanographer Canyon and farther down the canyon in several places at the base of the wall. White hake and ocean pout are found coexisting in surprising large numbers in this habitat. Other animals closely associated here are rock anemones, starfish, Jonah crab, and tilefish.

Criteria or preference	*Criteria or preference met?*	*Discussion*
		• Type IV habitat is a featured bottom of densely burrowed, semi-consolidated silt; it occurs chiefly on the upper-to-middle canyon walls. Jonah crabs, lobsters, and tilefish predominate in this habitat. Their association is perhaps the most distinctive in the canyons; Cooper and Uzmann (1977, 1980a,b) have called it the "pueblo village" community. Type IV habitat has been found at depths of 150-1000m on the canyon walls, but is most evident at shoaler depths (150-300m). Pueblo villages deeper than 300 m are occupied primarily by red crab, Jonah crab, white hake, and ocean pout. The apex predator of the villages is the tilefish. Pueblo villages appear to be the prime habitat and "home ground" of offshore lobsters. Some 20-50% of the adult population migrates onshore from the villages in the spring and early summer (Uzmann, Cooper, and Pecci, 1977; Cooper and Uzmann, 1980a,b), returning in the late summer and fall. • Type V habitat refers to duned sand on the canyon floor. This has been found only in Oceanographer Canyon, from the very northern end south to a depth of at least 700m.
Sensitivity to Anthropogenic Stresses (EFH Final Rule criteria)	Yes	The steep slopes of the canyon walls are generally inaccessible to mobile fishing gear, such as dredges and otter trawls, and except for seasonal trapping, canyon inhabitants are not targets of a fishery. Thus, the canyons serve as refuges for bottom species that are sought commercially elsewhere and for species that are disturbed or destroyed incidentally in the course of dredging and dragging. However, the upper slopes and less steep parts of the canyon system are accessible to fishing for species such as monkfish, offshore hake, red crab and others.
Extent of Current or Future Development Stresses (EFH Final Rule criteria)	Yes	In recent years, energy companies have suggested the use of the upper slope of the canyons as transmission lines for energy resources and products, such as natural gas, as a connection line between sources on the Scotian Shelf and the major U.S. metropolitan areas. Other examples of future development stress may exist.
Rarity of the Habitat Type (EFH Final Rule criteria)	Yes	The canyons may be regarded as highly modified areas of the continental slope that exhibit to varying degrees a more diverse fauna, topography, and hydrography than the intervening slope areas. Alternating erosional and depositional episodes over geologic time have shaped and modified these rare canyon systems into specialized habitats distinct from the classically defined slope province.
Will improve the	Yes	May reduce the development of these areas for fishing or non-

Criteria or preference	*Criteria or preference met?*	*Discussion*
fisheries management in the EEZ (Council preference)		fishing purposes and allow the natural processes to remain.
Include EFH designations for more than one Council-managed species (Council preference)	Yes	Many species designated under status quo and preferred alternative EFH
Include juvenile cod EFH (Council preference)	Yes	Very small amount in Lydonia, Oceanographer, Gilbert and Heezen Canyons.
Meet more than one of the EFH Final Rule HAPC criteria (Council preference)	Yes	Meets all four criteria.