New England Fishery Management Council

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MEMORANDUM

DATE: September 23, 2010
TO: Habitat Committee
FROM: Michelle Bachman, Habitat PDT
SUBJECT: EFH updates (Alternative 3 maps and text descriptions)

Introduction

In anticipation of the need for a Phase 1/2 DEIS, Council staff and NERO staff have been reviewing the EFH maps and text descriptions. A few general issues were identified and proposed updates are summarized in the following sections. If the committee agrees that they are appropriate, these updates will apply to most of the juvenile and adult lifestages for most species, because the 'Alternative 3' designation methods discussed below were very commonly selected as the preferred alternative in Phase 1. Any detailed, species-by-species updates deemed necessary will be presented at the next committee meeting.

Briefly, Alternative 3 involves plotting a percentile (75% or 90%) of the combined 1968-2005 fall and spring catch data from the NMFS survey, compiled as average numbers of fish caught within ten minute squares of latitude and longitude, and then adding ten minute squares that fall within preferred spring and fall bottom temperature and depth ranges, as long as they fall within the next highest percentile of catch (90% and 100%). Species and life stage-specific depth ranges are then used to crop the catch and habitat-based ten minute squares. For some deeper water species where catch data were lacking, depth ranges for the continental slope are also used. Next, ELMR and state survey data are used to map EFH in inshore areas. Finally, additional ten minute squares were filled in for some species as determined by the Habitat Committee, or when a ten minute square was unsurveyed and surrounding survey squares were designated as EFH.

One issue with the maps and text approved during Phase 1 was an occasional lack of concurrence between the map depictions and text descriptions. This mainly had to do with a difference between the methods used to determine the preferred depth and temperature ranges shown on the maps and those cited in the text descriptions. The same method is now being used to determine all the depth and temperature ranges so they are consistent in the maps and the text descriptions. Another issue was that depth-based cropping on the maps was not applied consistently to all ten minute squares meeting an appropriate catch percentile, such that squares that fell totally outside of the preferred depth range that would not be considered EFH according to the text description were shown as EFH on the maps. This issue has also been corrected. Another issue was that, in some cases, separate fall and spring temperature and depth thresholds were applied to different ten minute squares in the maps, resulting in inconsistent depth cropping between adjacent squares in some cases. We propose using a single depth range that integrates the fall and spring survey data, which corrects this issue. Finally, the coastal ELMR (Estuarine Living Marine Resource) areas that were mapped as EFH in the first omnibus EFH amendment were displayed as ten minute squares that approximated the original salinity zone polygons (sometimes not very well); these areas are now shown on the maps as the original ELMR GIS polygons.

When the PDT reviewed these updates, a suggestion was made to clarify on the maps whether a blank area was not EFH because it did not meet catch, temperature, or depth criteria, as opposed to areas that are not EFH because the various surveys do not extend into that area. This idea was supported by NERO staff, and Council staff have already begun work on this issue. In the combined EIS for Phase 1/2, the final proposed action maps and text descriptions will be shown in the body of the document, but all maps and text descriptions generated during Phase 1 will be appended for comparison purposes. In addition, the designations for each species and life stage will be preceded by a discussion of how the designations differ from the status quo designations, and, if applicable, from the designations approved during Phase 1.

Summary of Alternative 3 mapping methods:

1. **Add untrimmed layers:**
   a. ELMR bays/estuaries (full coverage for saline and mixed zones)
   b. Inshore TMS
   c. Ctte fill TMS
   d. 'Inshore' unsurveyed TMS (all except 2,3,6&7)
2. **Add trimmed layers**
   a. Continental slope depth ranges (these are trimmed by definition)
   b. Catch and temperature data trimmed by depth
      i. Map original percentile of NMFS survey catch data (75 or 90, as selected by the PDT/Ctte during Phase 1) as whole TMS
      ii. Generate habitat layer - map TMS that meet temperature criteria for fall and/or spring, AND intersect with next highest catch percentile (90 or 100)
   c. Map remaining unsurveyed TMS (2,3,6&7)
      i. Trim these catch, temp, and UTMS by the combined (fall and spring) NMFS survey depth range
3. **Combine all layers into a single shapefile, and trim entire file so that portions of squares in Canadian waters are removed**

Modified method for species with non-overlapping fall/spring depths (red and silver hakes):

1. **See above**
2. **Add trimmed layers**
   a. Continental slope depth ranges (these are trimmed by definition)
   b. Catch and temperature data trimmed by depth
      i. Map original percentile of NMFS survey catch data (75 or 90, as selected by the PDT/Ctte during Phase 1) as whole TMS
      ii. Generate habitat layer - map TMS that meet temperature criteria for fall, and/or spring, AND intersect with next highest catch percentile (90 or 100)
      iii. Map remaining unsurveyed TMS
      iv. Trim these catch, temp, and UTMS by both <u>spring and fall </u>NMFS survey depth ranges
3. **See above**

Differences from existing method:
- When TMS from NMFS catch data fall entirely outside the depth range, they are removed/trimmed. The modified approach seems more appropriate since it treats all TMS defined on the basis of NMFS survey catch the same, rather than trimming some but not others. The justification for the original decision (to trim TMS that overlapped with a relevant depth contour, but not to remove those outside the relevant depth contours) was not

well documented, and likely was unclear to members of the committee and public. This approach, which trims all catch-based TMS, is easier to explain and justify.

- Use of a single (annual) depth range for defining the habitat layers, with the exception of cases where the spring and fall depth ranges do not overlap (currently only juvenile silver and red hake). This approach helps prevent the creation of maps where adjacent TMS are trimmed by two separate depth contours. Also, it is more consistent with the reporting of the single fall/spring composite depth range in the text descriptions.

- Substrate data are ignored. Originally, substrate data were used in a manner similar to the temperature data, for a subset of species. However, not all species used this data source, and it often made little difference in the EFH maps as substrate preferences identified in the EFH sources documents are typically not very specific. Also, the substrate mapping approach used in the Alternative 3 maps departs significantly from that used in Phase 2/SASI.

- Removing squares in Canadian waters – this should have been done to the maps during Phase 1, and was a technical oversight.

- Updates to depth and temperature ranges – the ranges used in the original alternative 3 maps were estimated using a different method than was used to determine depth preferences for the text descriptions, even though the data sets were the same. The new method is more objective and, for some S/LS with "noisier" data, defines broader (and probably more realistic) depth and temperature ranges than the original method.

- Trimming continental shelf/offshore unsurveyed TMS – originally the UTMS were added as a last step, after the survey TMS were trimmed by depth.

Text descriptions

The text descriptions have been simplified and made to be more consistent with the maps. Also, supplementary information on temperature, salinity, and primary prey organisms that is summarized elsewhere in the EIS has been removed.

Example: Pollock

Approved (June 2007) text descriptions

Eggs: Pelagic continental shelf habitats as depicted on **[Pollock egg map]**. The following conditions generally exist where EFH for pollock eggs is found: bottom depths of 40 – 120 meters and water column temperatures of 2.5 – 13.5ºC.

Larvae: Pelagic inshore and continental shelf habitats as depicted on **[Pollock larval map]**. The following conditions generally exist where EFH for pollock larvae is found: bottom depths of 20 – 160 meters and water column temperatures of 3.5 – 11.5ºC. Larval pollock feed on copepods.

Juveniles: Pelagic and benthic inshore and continental shelf habitats in depths of 0 (relative to MHW) to 180 meters with a wide variety of substrates as depicted on **[Pollock juvenile map]**. Benthic EFH for juvenile pollock includes mud, sand, sand and mud, gravel, and rocky bottom with eelgrass and macroalgae. Other conditions that generally exist where benthic EFH is found are bottom temperatures of 2.5 – 12ºC, and, on the shelf, salinities between 31.5 and 34.5 ppt. EFH for juvenile pollock includes the intertidal zone. Juvenile pollock feed primarily on chaetognaths, amphipods, euphausiids, fishes (*e.g.*, herring), and squids.

Adults: Pelagic and benthic continental shelf habitats in depths of 80 – 180 meters with a wide variety of substrates as depicted on **[Pollock adult map]**. Benthic EFH for adult pollock includes mud, sand, sand and mud, gravel, mud and sand mixed with gravel, and rocky bottom. Other conditions that generally exist where benthic EFH is found are bottom water temperatures of 5.5 – 9.5ºC and salinities of 32.5 – 35.5 ppt. Pollock spawn over hard, stony or rocky bottom. Adult pollock feed primarily on euphausiids, fishes (e.g., herring, sand lance, and silver hake), and squids.

Pollock - Modified (August 2010) text descriptions

Essential fish habitat for pollock (*Pollachius virens*) is designated anywhere within the geographic areas that are shown in **[Pollock maps]** and listed in **[Pollock ELMR table]** and meets the conditions described below. Additional habitat-related information for this species can be found in Appendix B (supplementary tables and prey information).

Eggs: Pelagic inshore and offshore habitats in the Gulf of Maine, as depicted on **[Pollock egg map]** and listed in **[Pollock ELMR table]**.

Larvae: Pelagic inshore and offshore habitats in the Gulf of Maine, as depicted on **[Pollock larval map]** and listed in **[Pollock ELMR table]**.

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 **[Pollock juvenile map]** and **[Pollock ELMR table]**). EFH for juvenile pollock is found on a wide variety of substrates, including mud, sand, and rocky bottom with eelgrass and macroalgae from the shoreline (including the intertidal zone to MHW) 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 **[Pollock adult map]** and **[Pollock ELMR table]**). Adult pollock show little preference for bottom type. They spawn over hard, stony or rocky bottom.

(Pollock ELMR table will be shown here.)

<p style="text-align:center">***</p>

The following maps provide an example of how the alternative 3 maps are now being generated. Juvenile and adult pollock are shown.
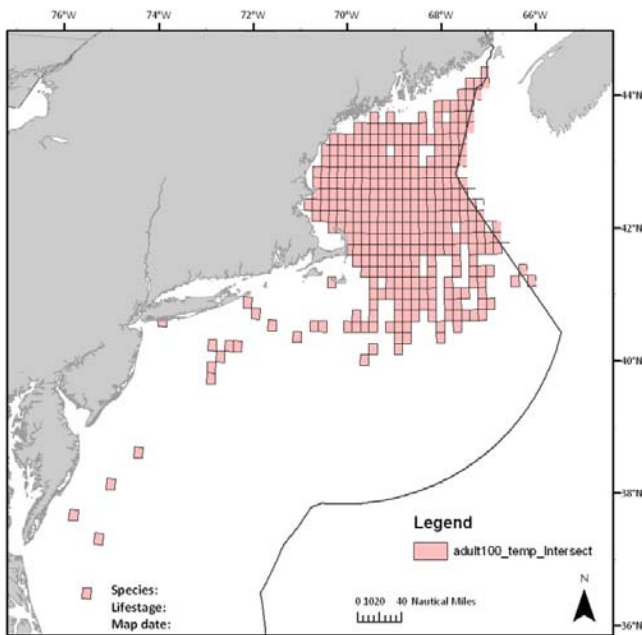
Example – adult and juvenile pollock map creation
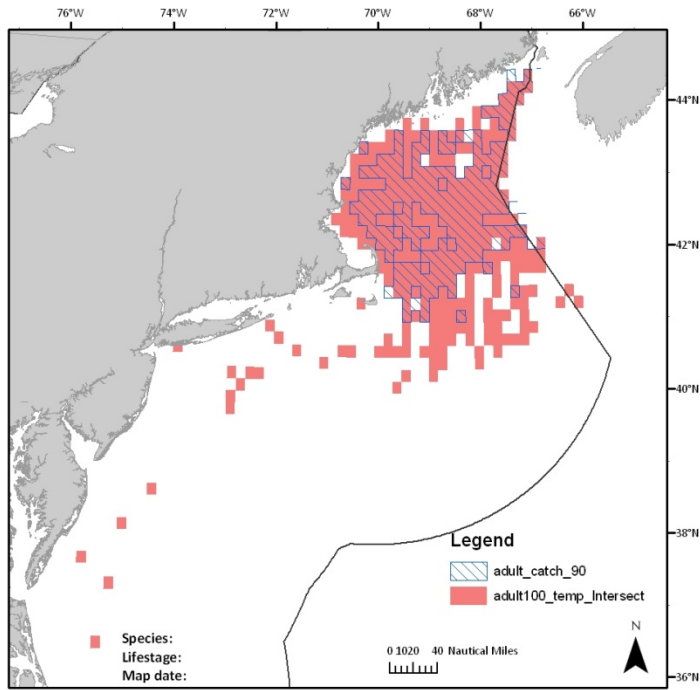
ADULT POLLOCK

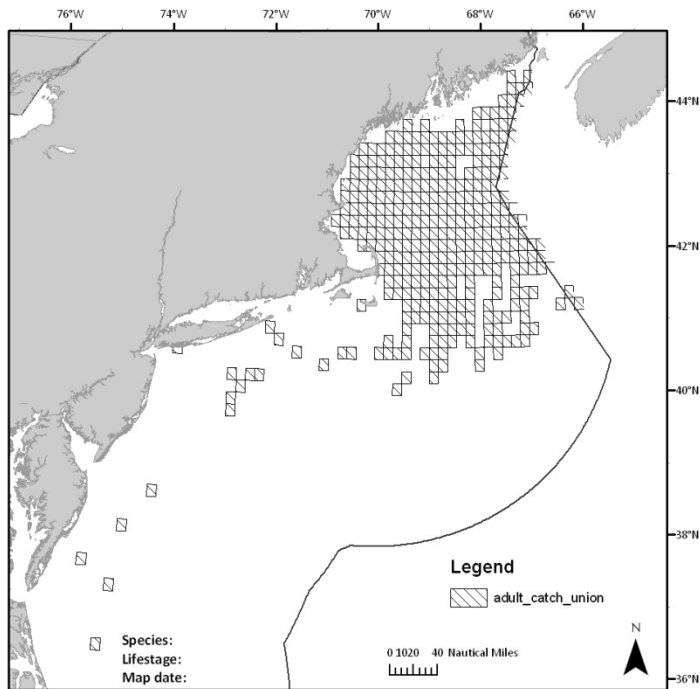1) Temperature designation added to catch layer at next highest percentile (100%)
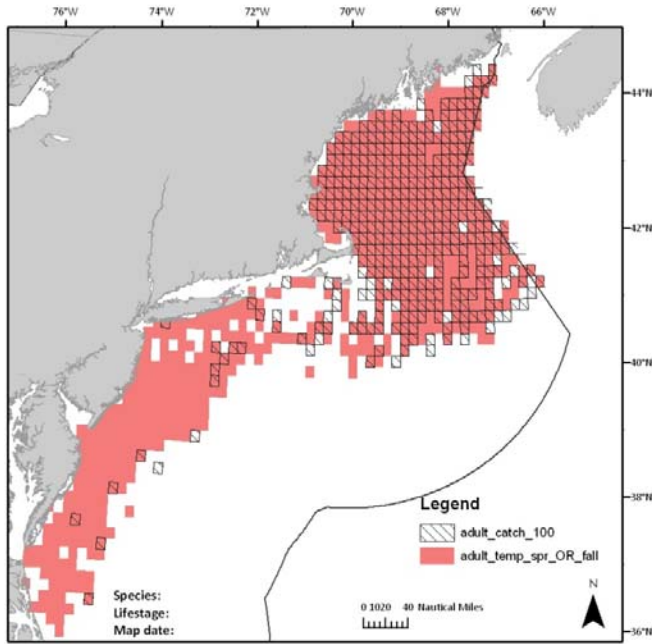
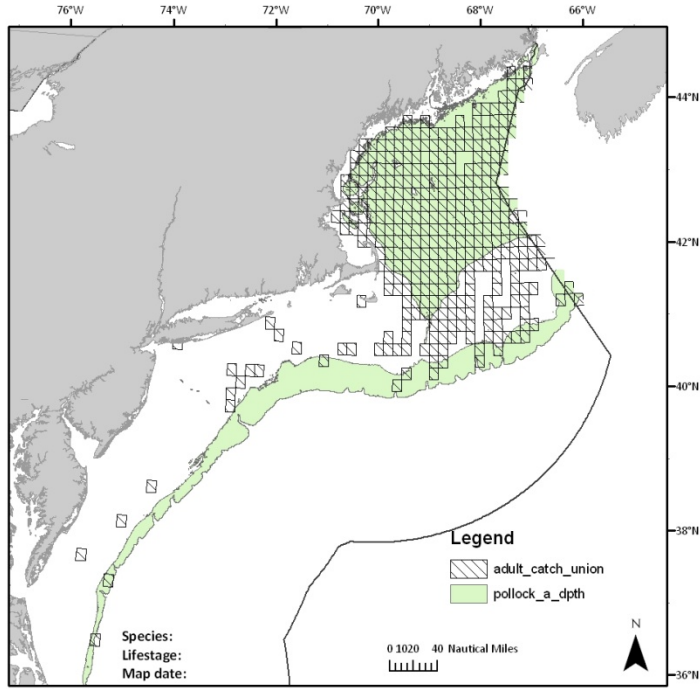2) Intersect of catch at next highest percentile (100%) and temperature designation

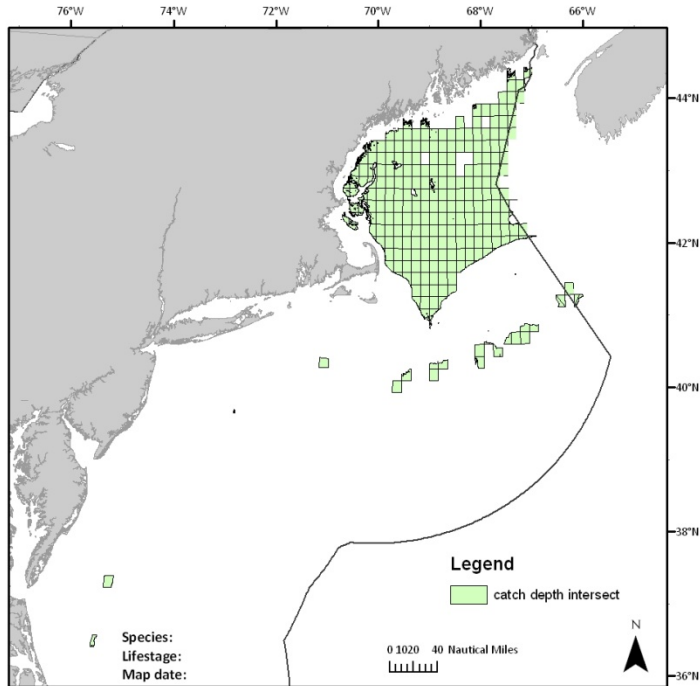3) Catch layer (90%) added to catch at next highest percentile (100%) (limited by temp)

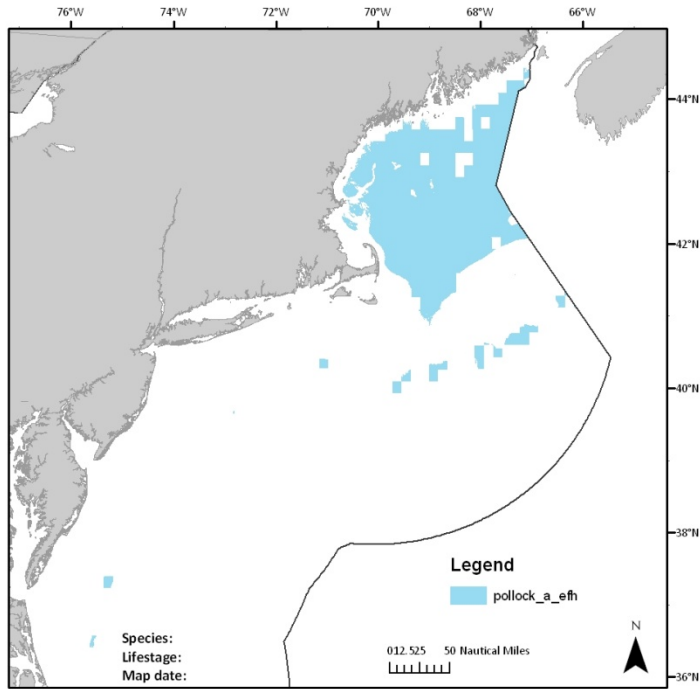4) Union of catch (90%) with catch at next highest percentile (100%) (limited by temp)
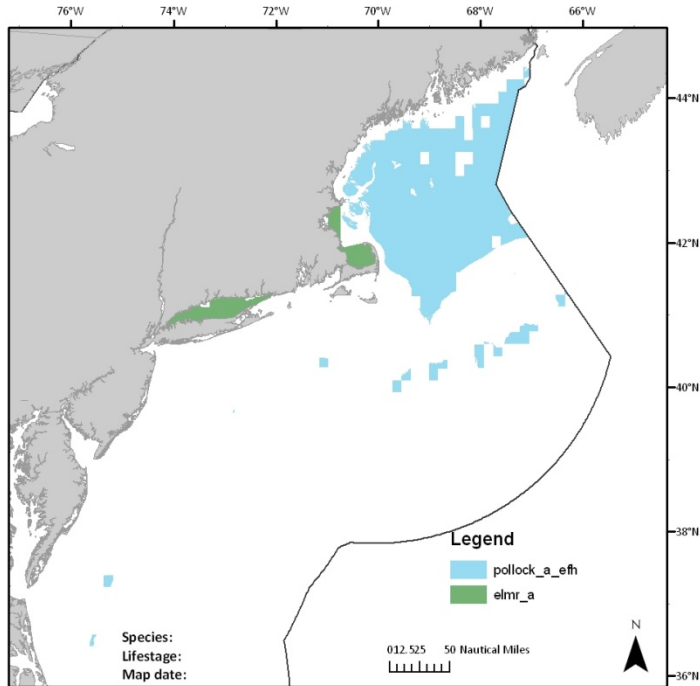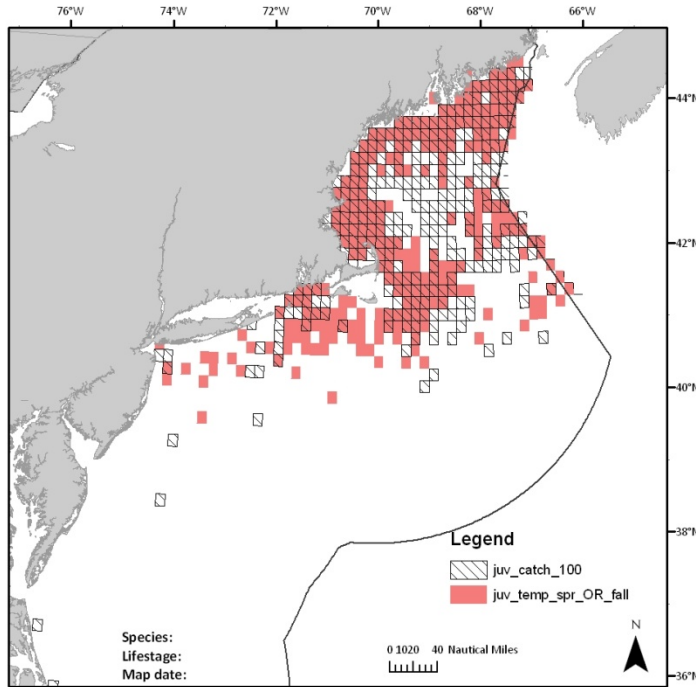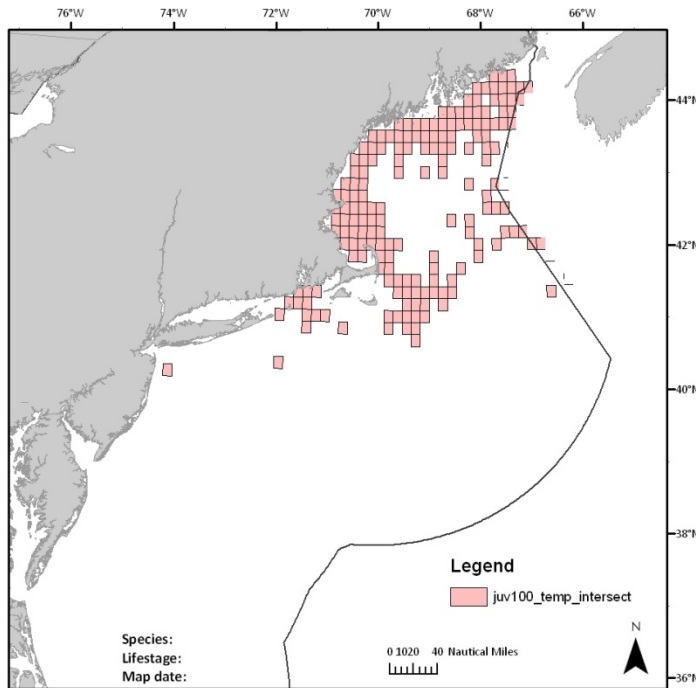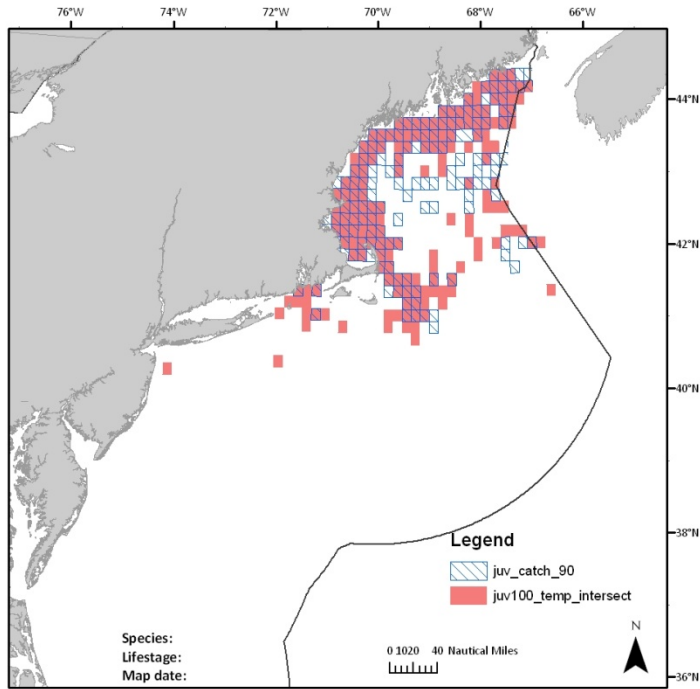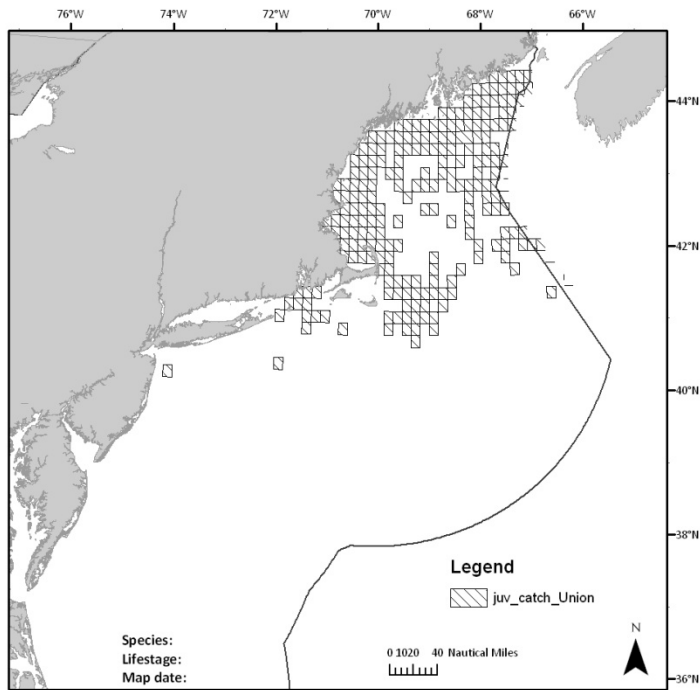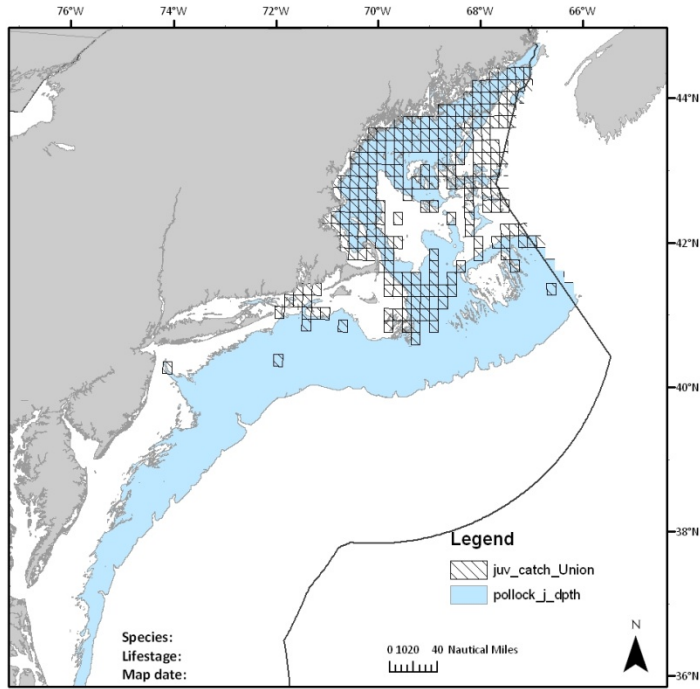
5) Designated depth added to combined catch layer

6) Intersect the combined catch layers with the depth designation

7) Combined catch intersected with depth and trimmed at EEZ

8) EFH file with ELMR added

JUVENILE POLLOCK

1) Temperature designation added to catch layer at next highest percentile (100%)

2) Intersect of catch at next highest percentile (100%) and temperature designation

3) Catch layer (90%) added to catch at next highest percentile (100%) (limited by temp)

4) Union of catch (90%) with catch at next highest percentile (100%) (limited by temp)

5) Designated depth added to combined catch layer

6) Intersect the combined catch layers with the depth designation
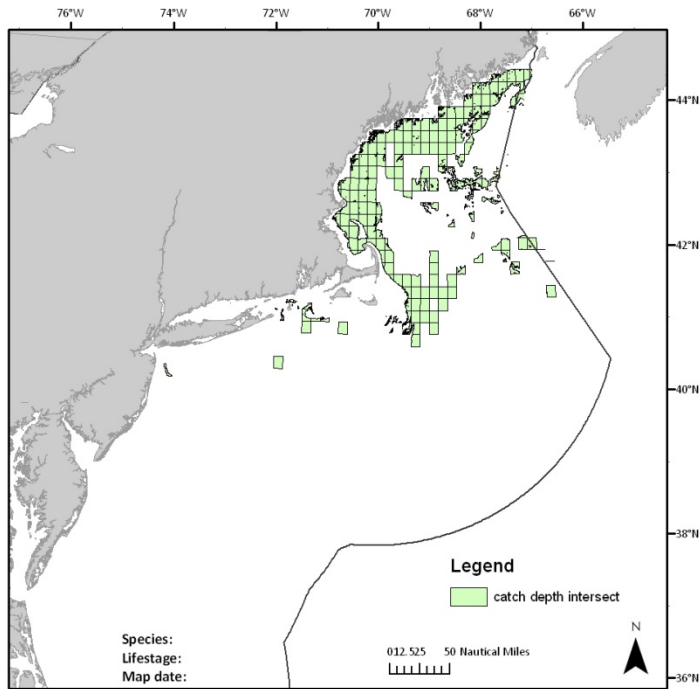
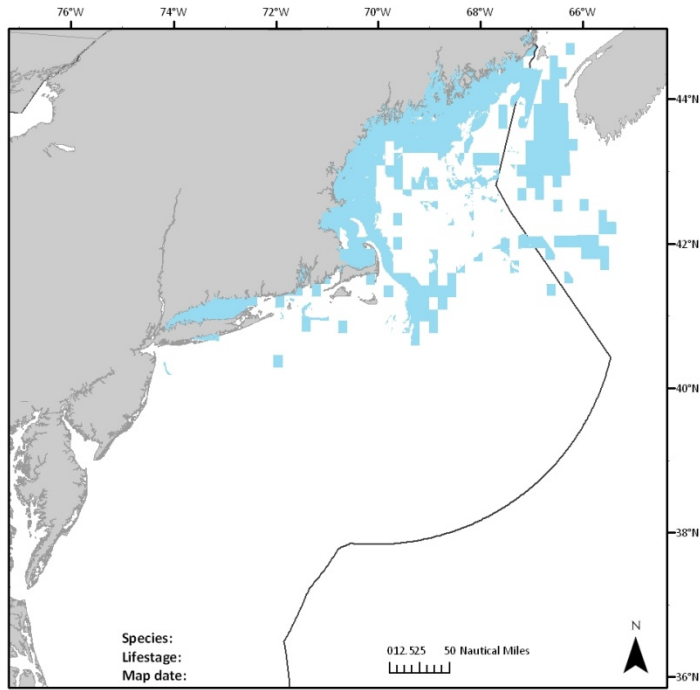7) Combined catch intersected with depth and trimmed at EEZ
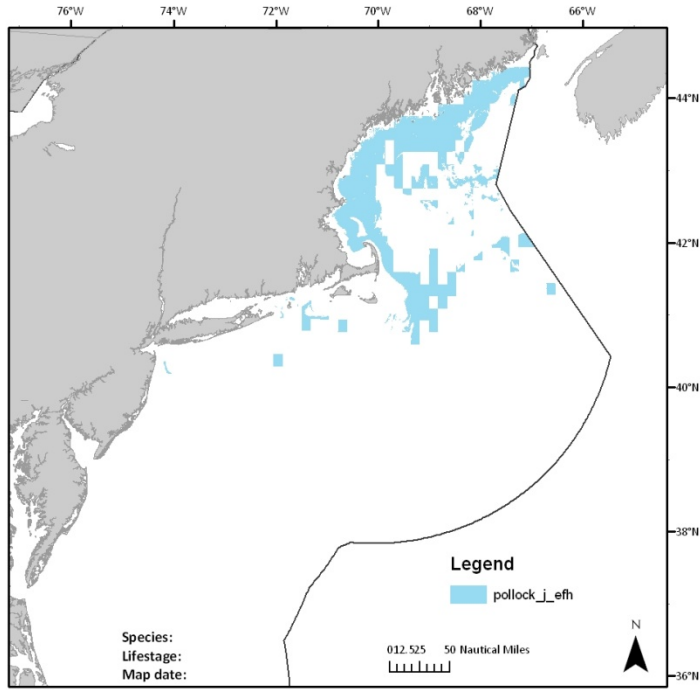
8) EFH file with ELMR, inshore survey, and unsurveyed squares added
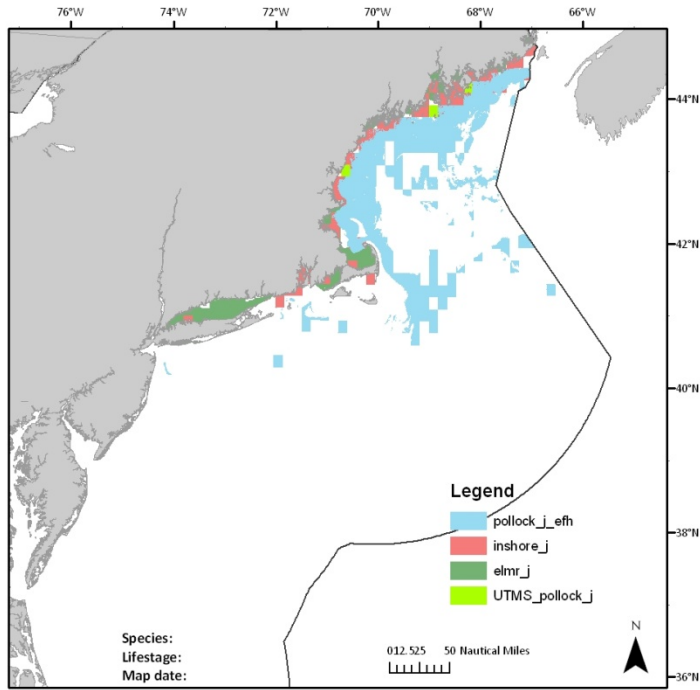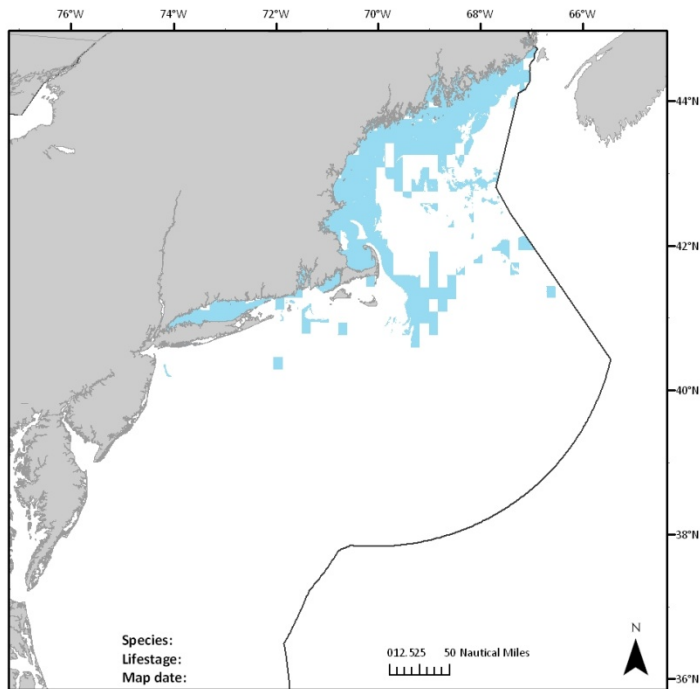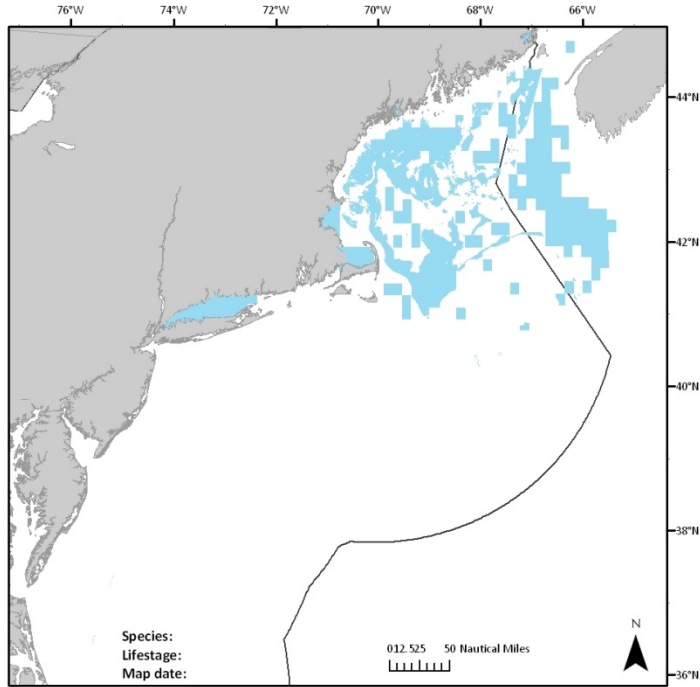
Old vs. new maps

Old juvenile pollock map-

New juvenile pollock map-

Old adult pollock map-

New adult pollock map. Note the new adult max depth of 300 m, vs. 180 m previous max depth.