New England Fishery Management Council
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MEETING SUMMARY

Habitat Plan Development Team

February 16, 2017

The Habitat Plan Development Team held a conference call on February 16, 2016 from 9:30 a.m. until 3:45 p.m. to discuss the coral amendment and the image analysis being developed for the clam framework.

Plan Development Team members: Michelle Bachman (Chair), Peter Auster, Jessica Coakley, Kiley Dancy, Geret DePiper, Rachel Feeney, Marianne Ferguson, Kathryn Ford, Travis Ford, Dave Packer, Doug Potts, Katie Richardson, David Stevenson, Page Valentine, Carl Wilson

Other participants: Megan Ware, ASMFC staff; Kathleen Reardon, Maine DMR staff; Alison Verkade, GARFO Habitat Conservation Division Staff, Burton Shank, NEFSC staff

Audience: John Quinn (Habitat Committee/Council Chairman), Chris McGuire (Habitat AP Chairman), Aaron Kornbluth, Libby Etrie, Heidi Henninger, Heather Coleman, Maggie Raymond, Greg Wells, and others

Major conclusions of call:

- Additional multibeam mapping would be helpful in terms of refining the boundaries of the Gulf of Maine coral zones.
- The PDT will continue to work with the ASMFC Lobster Technical Committee to assess impacts of the coral zone alternatives on the lobster fishery.
- The PDT will continue to work to describe coral survey data appropriately, given caveats about what they can and cannot tell us about the distribution and density of coral habitats and the seafloor features they are linked to.
- The PDT suggested using the best information possible for economic impacts analysis of any given alternative. This could include using more than one approach for each area if multiple approaches were reasonable given the data.
- The PDT identified an approach for mapping the results of the image analysis conducted to support the clam framework.

Deep-sea coral amendment discussion

There was some discussion of coral amendment implementation timing as it related to the possibility for new data to be collected to support the development and analysis of alternatives. Council staff suggested and GARFO staff agreed that if preferred alternatives are selected in June, and a final amendment document/EA is submitted shortly thereafter, that the amendment could be implemented by the end of 2017, or shortly thereafter. GARFO staff indicated that they did not view this action as atypical in terms of rulemaking and implementation.

In particular, in the context of new data, the PDT discussed additional multibeam mapping for the Gulf of Maine. Maine DMR has an Olex system and is planning a mapping cruise in the Mt. Desert Rock region, but have had a few setbacks that have delayed this mapping project. Hopefully the work can be completed in the coming months. In addition, there is likely ship time available on the NOAA ship Thomas Jefferson later this year that can be used for multibeam mapping. During the call, the PDT discussed that the timing of this cruise could be in June, but later it was confirmed that September was more likely. DMR, NEFSC, and Council staff will plan to coordinate later this spring on mapping efforts to provide the greatest spatial coverage in the highest priority areas. One goal of the mapping efforts would be to ascertain the extent of the 'bump' features on the seafloor in Jordan Basin. The PDT discussed that the workshops planned for March would be a good opportunity to get industry information about the spatial extent of these features, particularly 118 Fathom Bump and 96 Fathom Bump.

The PDT also noted that the DSC habitat suitability model is being updated this year (timing uncertain) with additional coral records and environmental data. Updated multibeam data will be an important input for the revised model. Low resolution seabed terrain data are likely the primary reason why the model results do not align well with coral observations in the Gulf of Maine. For example, complex seafloor features in areas of high coral abundance such as Outer Schoodic Ridge or 114 Fathom Bump are not well resolved in the coastal relief model, but are more clearly depicted in the multibeam data collected recently (the maps in the amendment document show these data). The lower resolution coastal relief model was used to depict seafloor terrain in the first version of the habitat suitability model. NOAA is currently working on a revised bathymetry data set that will incorporate any higher resolution data available. Hopefully the updated bathymetry data compilation will be available to view during the March workshops.

Next the PDT discussed the economic analysis. While the analysis is based on vessel trip reports (VTR), other data including vessel monitoring system can be used to caveat the results. Staff noted that the revenue maps will be provided at the end of the document. The PDT discussed providing key caveats throughout the text in each section as needed, including in the figure/map captions. General caveats are also provided in the introductory section describing the approach to analysis.

Dr. Feeney briefly described how she is approaching social impacts analysis. While the economic analysis is at the gear and species level, the social impacts analysis will present these same data by port. A major challenge thus far has been determining whether annual revenue estimates for a particular port meet confidentiality requirements. Specifically, port-level estimates can only be provided if there are three permits landing in that port, and if those three permits are selling to at least three dealers (with dealers not necessarily located in the port). If

port-level data cannot be reported, data will be aggregated at the state or other higher level. Disaggregating the port-level data to specific fisheries would be informative, but will likely be difficult for many ports given these confidentiality requirements. Dr. Feeney will contact DMR staff to determine additional ports that might be affected by the Mt Desert Rock (MDR) and Outer Schoodic Ridge (OSR) areas specifically. Only 6% of the lobster vessels potentially fishing in these areas (i.e. federally permitted vessels that operate in Zone A, B, or C) have VTR requirements, which means that many vessels are not represented in the VTR data.

Next the PDT discussed information provided by the ASMFC Lobster Technical Committee (TC), specifically when to use those data in addition to or in lieu of the PDT's VTR data in the amendment document analyses. The ASMFC work is summarized in a January 25 memo from the TC to the ASMFC Lobster Board, and the PDT work is summarized in the January 27 draft of the coral amendment (see AP materials). The PDT focused on the inshore GOM areas first. Three approaches have been used in these areas:

(1) Scaled VTR data (PDT, 1/27/17 amendment draft): assume spatial footprint of VTR, but scale up the lobster revenue in each area by approximately 482% (MDR) and 247% (OSR).
(2) Percent area approach: assume revenues are evenly distributed across a broader geographic area, and estimate revenue in each zone based on the percent of the broader area covered by the zone.
    a. The PDT (1/27/17 amendment draft) used total revenue at the zone and distance from shore resolution and estimated values for MDR and OSR individually using the percent area covered by each zone.
    b. The TC (1/25/17 memo) used total revenue for federal waters of all zones A, B, and C combined, and estimated a single revenue value for MDR and OSR in combination.
(3) Multiply vessels, percent income, and trip value (TC 1/25/17 memo): multiply the number of vessels that fish in both areas, what percentage of their income comes from the areas, and typical trip values to estimate total revenue from the two zones. Two options for vessel numbers (25 and 50) and three percentages (25, 50, and 100) were used to derive a range of estimates.

The results are highly variable depending on the approach used, with the scaled VTR estimates being the lowest, the percent area estimates in the middle, and the vessel/income/value estimates highest. The PDT wondered if the vessels/permits that submit VTRs are different from those that do not. These vessels submit VTRs because they hold one or more additional federal permits, triggering the VTR requirement. For example, are they larger/smaller, do they fish from a certain subset of ports, or do they have higher or lower revenue per trip? Spatially, based on the revenue heat maps, it appears that the VTR vessels/permits do not report fishing in locations that are known lobster grounds, which would suggest that these vessels are not representative. DMR staff can investigate the differences between VTR and non-VTR vessels. Perhaps more importantly, VTR vessels only represent 6% of the federal permit holders in lobster zones A, B, and C. Due to this low percentage, and given concerns that the data are not representative, the PDT decided not to scale the VTR data for the inshore GOM areas, but rather, to report the VTR information as-is,

and indicate that VTRs are submitted by only a small percent of the fleet. The PDT determined that it was important to present only the best estimate or estimates for each area.

Next, the PDT discussed the third approach developed by the TC. This method uses estimates for numbers of vessels and percentages of income that are difficult to verify given the lack of spatially specific reporting in the fishery. Additional industry engagement may help identify the number of vessels and their income more accurately. Also, the method assumes that the harvester reports are representative in terms of trip value by month at the zone and distance from shore level. This is likely a reasonable assumption given that the vessels selected to submit harvester reports are intended to be a representative subset of the fleet (based on permit category and other factors). The TC felt that assuming 50 vessels at 50% income produced the most realistic estimate. Assuming a rough average revenue of $\$10{,}000/km^2$ across federal waters of zones A, B, and C (total revenue divided by total area), the 50 boat/50% estimate suggests that the coral zones are around 3.3 times more productive than the global average value. This result lines up well with reports from a couple of industry members that the coral zones are two to four times more productive than average, but additional verification of these multipliers would be helpful.

The PDT briefly discussed the implications of effort shifts in the lobster fishery in terms of potential protected resources impacts. Results of the vertical line/large whale co-occurrence model suggest that the area around Outer Schoodic Ridge has relatively high co-occurrence rates, while co-occurrence rates are estimated to be low around Mt. Desert Rock. In areas with high co-occurrence rates, it is possible that shifts in fishing effort could lead to higher rates of gear interactions with whales. The PDT wondered whether there are any spatial closures that affect the lobster fishery and if closures would lead to high concentrations of traps along closed area boundaries. Although spatial closures are not common in the lobster fishery, there is a seasonal closure off Monhegan Island and traps are known to be concentrated along the boundary during the closed season. Anecdotally, catch rates are higher for those who set traps near the edge of the closure. Thus, it seems likely that concentrations of traps would occur around the coral zones should they close year-round. This curtain effect could lead to additional trap/marine mammal, depending on how whales and other mammals are distributed relative to any closures, and their patterns of movement. These issues will be assessed further in the EA for the amendment but this analysis has not been written yet.

Next, the PDT discussed the TC's analysis of lobster fishery revenues in the canyon/slope region. For the canyons, broad zones, and Marine National Monument, the TC used VTR data combined with industry information about the percentage of fishing effort by depth range to assign revenues spatially. The Area 3 permit holder survey conducted last year asked respondents to summarize how their trap effort and revenue are distributed amongst depth intervals, specifically focusing on depth ranges of <100m, 100-200 m, 200-300 m, 300-400 m, and >400 m. The TC analysis averaged the percentages for each depth range across survey respondents to estimate percentages of effort and revenue at the fleet level. Weighted averages were also computed to account for the fact that some vessels expend more effort and generate more revenue than others. These percentages by depth were then applied to total landings from all overlapping statistical areas from the VTR database. Once a depth-based revenue map was defined, revenue was summed within particular coral management zones.

The TC's depth interval analysis assumes a uniform distribution of effort within each depth band, across the entire canyon/slope region. The analysis also assumes that all lobster trap effort occurs shallower than 500 m, and that VTR effort is assigned accurately at the statistical area level. In this analysis, VTR data were not scaled up to account for vessels that do not report via VTR (in the PDT's analysis for the canyons/slope and offshore GOM, a +24.2% adjustment was applied to lobster revenues). Also, although the analysis was intended to represent an annual average estimate of revenue by depth, the depth distribution of lobster trap effort is known to be seasonal, with traps set deeper in winter and shallower including up on Georges Bank in summer.

Overall, the results of the TC's depth interval analysis are consistent with the PDT's analysis of VTR data for the canyons and slope. One place where differences were noted was the Marine National Monument, where the TC estimated more revenue on an annual basis than the PDT's analysis did. NEFSC staff explained that there is a particular individual who is known to fish within the monument but reports fishing in deeper water near the seamounts. Assuming that the revenues generated by this individual occur within the monument increases the revenue estimates for the monument area, relative to those calculated by the PDT. This led to a more general discussion of how VTR data are audited. It was noted that a number of vessels are known to fish and report based on LORAN lines, and that these reported positions are then converted into degrees of latitude and longitude for input into the VTR database.

ASMFC staff noted that they are planning a meeting of their lobster advisory panel soon, and will discuss the TC's analyses with that group to gather feedback. Final information will be provided to the Council as soon as possible. The PDT chair noted that her goal is to integrate TC information into the draft amendment document/environmental assessment.

Finally, the PDT discussed how to present coral data. This discussion was spurred by the conversation at the January 30 Habitat Advisory Panel meeting about how to refine coral zone boundaries by more narrowly defining management areas around the locations of recent survey tows/dives. In addition, based on information requests made to staff from Council members, other Council stakeholders, and the press, there seems to be interest in understanding coral distribution by depth, and in knowing about the types of corals found at each dive site and their relative densities. The PDT discussed the underlying dive/tow and point observations of corals, and how they relate to these issues.

Ideally, coral data, either point observations or information from dive transects, would be used to identify general locations where corals occur. The coral data can also be used to assess species richness and to give some sense of environmental attributes such as high slope that seem to be positively associated with coral occurrence. In terms of defining management area boundaries, seafloor terrain data are more useful than point locations or dive tracks for bounding the spatial extent of coral habitats. Unfortunately, high-resolution terrain data have not been collected for certain areas where corals occur, for example 96 Fathom Bump and 118 Fathom Bump in Jordan Basin and at Lindenkohl Knoll. Areas including 114 Fathom Bump, portions of central Jordan Basin along the Hague Line, and Outer Schoodic Ridge are partially mapped. There is a high resolution (1/3 arc second, ~10 m) digital elevation model that fully overlaps the Mt. Desert

Rock site. High resolution terrain data are generally available for the continental slope and canyons, with some small gaps in certain areas.

In the canyon and slope region, the habitat suitability model is useful for confirming the rough spatial extent of habitats suitable for corals. However, as noted earlier in the PDT's discussion, the model is not nearly as useful in the Gulf of Maine, given lower resolution terrain data for this part of the region. The group agreed that the model results should be used to analyze the canyon and slope zones only.

The PDT reiterated previous comments that the recent coral survey tows and dives were exploratory. In the GOM, researchers were guided by the results of 2002-2003 cruises in the Mt. Desert Rock and Western Jordan Basin regions, and selected dive sites for 2013-2015 by assuming that corals were likely to be found in areas with similar geology and hydrology. This led to the selection of new dive sites in hard bottom areas with high topographic relief. Broadly, the intent was to determine where corals occur and delineate the spatial extent of the coral habitats, and sampling was iterative over the three year period. Dive locations were not random in the sense of an abundance survey. For the canyon/slope surveys, at least the ones using the TowCam system, sampling locations were selected to ground truth the habitat suitability model, and thus deliberately targeted a variety of habitats along the continuum of low to high predicted habitat suitability.

In the Gulf of Maine, and also in the slope/canyon region, the surveys were designed to link coral habitats to particular geomorphic features, versus immediately provide a product or set of alternatives based on variation in density. This was consistent with the approach used to develop earlier alternatives in the Gulf of Maine and in the canyon/slope region. While general information about coral distribution by depth can be obtained from the survey data, the surveys were not designed to produce a specific estimate of minimum depth of occurrence. High 'coral garden' densities of greater than 0.1 colonies/m^2 along one portion of a dive are not a guarantee that dense coral habitats occur over a larger adjacent area, and conversely, the presence of only lower density habitats in the imagery from a dive doesn't mean that dense coral habitats do not occur nearby. In the Gulf of Maine, the PDT doesn't view certain coral zone alternatives as more or less important than others (this may be true for the various canyon zones as well, but the discussion during the call was focused on the Gulf of Maine data and zones). The group discussed that the AP conversation seemed to be implying the prioritization of some areas over others, and the PDT was reluctant to prioritize among the zones.

The PDT also noted that it was important NOT to view the video and still imagery from the recent ROV and towed camera dives as a better source of data than earlier coral presence records. Many records in the 'historical' dataset were collected using similar video/photo technology and have good quality position data, such that they are reliable indicators of coral presence linked to seafloor features, at least at the time the data were collected. Staff can look for submersible (e.g. Alvin) data in the 'historical' database to highlight these records in the evaluation of coral zones.

The PDT also discussed evidence for gear interactions with corals. This evidence includes documented coral catches in fishery observer data, but also observations of gear marks and

derelict gear in coral surveys. Collectively, this information cannot be used to determine rates of interaction in particular gear types, but can be used to inform a general understanding of the interactions between fishing gears and corals. In addition to the section on observer data in the amendment document, the PDT suggested collating gear marking and derelict gear observations across all recent cruises to add to the discussion of fishing gear impacts on corals.

Clam framework image analysis discussion

The PDT reviewed the image analysis project to support the identification of clam dredge exemption areas in the Great South Channel and Georges Shoal Habitat Management Areas. Alison Verkade (NMFS GARFO HCD) provided examples of image classifications, comparing her results with the original SMAST database for the same areas. As a reminder, the analysis estimates four values for each image:

1. Percent area of each image covered with gravel (gravel = pebble, cobble, and boulder in combination), binned into <10%, 10-30%, or > 30% (new data not originally generated by SMAST analysis of each image)
2. Presence of cobble (confirm SMAST assessment)
3. Presence of boulder (confirm SMAST assessment)
4. Presence of long-lived epifauna (similar to SMAST assessment, which was conducted at individual taxa level)

Because these data are collected at the image level, but the station (four images) is the sampling resolution, the PDT discussed how to summarize data for a station, and how to map the results. In general, there was good agreement with the original SMAST database, but the percent gravel results, depending on how they are used, can affect the mapping of certain stations relative to the dominant sediment method used previously. After some discussion, the PDT agreed to consider presence of an attribute at the station level, rather than averaging across quadrats. The PDT also agreed to assign each station to one of two categories: low complexity, where percent gravel coverage was less than 10% in all image, and no cobble or boulder was present, or high complexity, where percent gravel coverage was 10-30% or greater in at least one image, or cobble was present at the station, or boulder was present at the station.

The idea is that a Voronoi polygon map of stations coded as not complex vs. complex would provide a starting point for identifying exemption areas. Additional map layers, including % gravel >30, cobble present, boulder present, and long-lived epifauna present, can provide additional information about areas to close vs. exempt.

Ms. Verkade will continue additional quality control and data entry before working with staff on mapping the data. The PDT will have a call to review the results when they are ready.