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Habitat Plan Development Team Meeting Summary

July 26-27, 2010
Boston MA

The PDT met on Monday and Tuesday, July 26 and 27, 2010, to discuss issues related to alternatives development for the Omnibus EFH Amendment. Team members in attendance included Michelle Bachman (NEFMC staff, chair), Chad Demarest, Brad Harris, Kathryn Ford, Jon Grabowski (via teleconference, day 1), David Stevenson, Tom Hoff, Page Valentine, and Steve Eayrs (day 2). Committee members in attendance included David Preble (chair) and Gene Kray. Advisory panel chair Dave Wallace and advisory panel member Ben Cowie-Haskell also attended. One to two additional audience members attended each day of the meeting.

SASI model data inputs, results, and other sources of data (Day 1)

One PDT member noted that there is a lack of agreement between SASI substrate data and substrate distribution data from other sources. Because Z∞ (Z infinity; adverse effect measure) is closely linked to substrate type, these differences should be considered when using model outputs to develop management alternatives.

It was discussed that it would be useful to compare SASI substrate grid to other interpretations available. It was also suggested that a detailed breakdown of how Z is calculated (i.e. how are substrate/energy based S-R values and area swept data combined) be prepared for an example area, as an illustration.

One team member noted that it will be important to document the locations where the model is believed to perform well, and where there are difficulties, and then to caution users (including, but not limited to, the habitat committee) regarding the use of model outputs in those difficult locations. It was emphasized that there should be a clear statement of the methods used to identify areas where results should be interpreted with caution, so that use of the results in other areas is not undermined. On one hand, a team member argued that going forward with recommendations based on current model outputs is problematic, given known data issues. On the other hand, the currently available data are vastly superior to that previously available, and should clearly be used to the extent possible, given caveats as described above. The team agreed that the ultimate solution to these issues is increased sampling in data-poor areas.

Specifically, the team discussed why multibeam data weren't incorporated into the base substrate grid at the outset. At the time, as now, there were issues with both the sampling and

with converting the data into a format commensurate with other data sources, which are grain-sized based dominant substrate. The other issue is the lack of ground-truthing. For example, the team decided that a major reason why the substrate classifications for the SBNMS multibeam data could not be compared with the substrate types in SASI was the fact that they were based strictly on backscatter intensities. This a common problem that makes it problematic to use multibeam data to reliably map bottom habitats, and was recognized early in the process of developing the base substrate layer for the model.

It is critical to emphasize that the PDT has been clear from the beginning that other data sources will be brought into the model in the future, if appropriate. Also, the PDT has stated repeatedly that SASI would not be the only tool that it and the Habitat Committee would use when recommending/making management decisions, and that data sources and reliability would be evaluated carefully when applying the results of the model to define clusters, etc. In discussing the model outputs and spatial analyses and their application to alternatives development, a team member emphasized that closed area alternatives only make sense in the face of spatial heterogeneity in seabed impacts. In terms of comparing the relative benefits and impacts of various alternatives, the key will be to examine both the seabed impact function and the catchability function (this is what Z Net Stock is designed to do).

Ben Haskell (SBNMS staff, Habitat AP) acknowledged the need to go forward with SASI-based alternatives development, but expressed concerned that non-cluster (Local Indicators of Spatial Association – LISA – cluster) areas would not be adequate represented in the process/discussed by the committee. A PDT member responded that the Habitat Committee can decide to implement management measures in areas identified in the LISA analysis, or in any other areas that seem appropriate; at their June meeting, the committee recommended that the PDT look specifically at areas that do not cluster in the LISA analysis, including parts of Cashes Ledge and the Western Gulf of Maine Closed Area.

The team also discussed the EAP (Equal Area Permutation) outputs. There was a question as to whether or not the EAP maps were intended to draw attention to alternate area locations that would be expected to perform better in terms of minimizing adverse effects as compared to the area of interest. Another PDT member emphasized that this was not the intended use of the EAP analysis.

Moving forward after lunch, the team discussed how to proceed with an evaluation of which areas have data limitations/lower levels of confidence in model outputs. Brad Harris noted that one approach would be to calculate coefficients of representivity. For areas identified as data limited, other available sources of information would then be identified. However, the question remains as to how to best apply that additional information.

The team then revisited the topic of multibeam data, focusing on the SBNMS dataset in particular. One team member noted that raw backscatter data shouldn't be used without ground truthing. She also emphasized that the distinction between gravel (granule pebble) and

sand can be challenging. Another team member noted that for this data set, he was confident that low backscatter indicates mud substrate. In order to incorporate this set of multibeam data into the model, at a minimum, gravel would need to be decomposed into separate granule-pebble and cobble categories. It was not clear whether this could be done based on the backscatter values, or if a blanket assumption of a 50/50 or some other ratio would need to be assumed. Beyond this issue, there were concerns that ground truthing was not done for this data set.

Ben Haskell expressed some frustration that the multibeam data were available but that it didn't appear that they could be fully incorporated – he asked the PDT to present a comparison between the two sets of model outputs resulting from the multibeam grid and the grab/video sample-based Voronoi grid. The team discussed a reluctance to compare these two sets of model outputs directly, given that they are likely based on incommensurate substrate data layers. A team member suggested that a possible way forward might be to use the multibeam data provided by SBNMS to run the model, but then present the results as areas within SBNMS that are relatively higher or lower vulnerability so that the Committee and Council can see where attention should be focused. If the data were presented in these terms (e.g. % $Z\infty_{multibeam}$), rather than in the same units as previously calculated $Z\infty$ values, that the risk of comparing the two sets of outputs directly would be reduced.

Over the long run, the PDT acknowledged that a method should be developed for incorporating multibeam data into SASI.

Spatial analyses/clusters (Day 1)

Brad Harris explained that the p-values used in the LISA analysis are not same as those more conventionally used to compare between two sets of values. Rather, the p-values are intended to show, when the SASI $Z\infty$ data set is repeatedly sampled, how often a given value exceeded a particular test value. In other words, the p-values are thresholds intended to define a cell as being a member of a cluster, or not. Given high levels of global spatial autocorrelation in the data, and due to the high number of observations, a smaller p-value helps to avoid type I error. In this case, type I error means that an area is identified as a cluster when it is not actually a cluster. Brad also noted that for this data set, the clusters are very clearly outliers from the rest of the data set, and he emphasized that increasing the p-value from 0.01 to 0.05 or 0.1 does not result in different clusters, but rather an expansion of existing clusters along their margins.

The team decided to analyze and present information about clusters based on p values of both 0.01 and 0.05. For each cluster at both probability values, the team will prepare a summary that includes: (1) available geological data, (2) available energy data, (3) $Z\infty$ statistics, and (4) source information for substrate and energy data.

The team discussed that other information should be considered if and when cluster boundaries at either probability level are converted to habitat management area boundaries. One approach

might be to run the SASI model using a higher resolution (i.e. smaller than 100km^2) grid size, in order to more finely delineate hotspot boundaries.

EFH maps and text descriptions – remaining issues from Phase 1 (Day 1)

At the end of Day 1, the PDT discussed a few issues related to the Phase 1 EFH text descriptions and maps. Broadly speaking, the goal is to make the EFH maps and text descriptions error-free, and as consistent with one another as possible.

One issue with a number of the 'Alternative 3 – catch plus habitat' maps is that some catch-based ten-minute squares (TMS) are cropped according to depth (as are the 'habitat' layers defined by depth, bottom temperature, or substrate), but some catch-based TMS falling outside the depth contours are not. Given that the text descriptions for these species and lifestages (juveniles and adults only) often indicate a specific depth range between which EFH occurs, these catch-based squares would not actually be interpreted as EFH during the consultation process, but are shown on the maps nonetheless. (As a reminder, a particular location is defined as EFH if the text description applies to a particular mapped location.)

There are a few potential solutions to this problem. (1) Keep the text descriptions as is, clearly defining EFH as only occurring between certain depths, and keep the maps as is, but clearly note in the map captions that EFH only occurs in the depth range specified in the text description. (2) Keep the text descriptions as is, and crop the mapped areas to be consistent with the text descriptions. (3) Modify the text descriptions to indicate that the species is more common at the defined depth range, and create the maps using untrimmed catch layers in addition to the depth trimmed habitat layers. This option would mean that EFH would be designated in a larger area for these species. (4) Keep the maps as-is, and modify the text descriptions to be more consistent with the maps.

The PDT recommended the latter option, specifically keeping the maps as-is (with the exception of correcting occasional errors or addressing specific issues indentified below), and modifying text descriptions to improve consistency and clarity. Any changes, whether specific or broadly applied, will be explained to the habitat committee at the next meeting where EFH designation issues are discussed.

Another option (5) would be to completely revise the way EFH is mapped for under the alternative 3 (catch plus habitat) methods. The team discussed various ways in which this might be accomplished, and concluded that while such a revision might be useful and more consistent with the Phase 2/SASI methodology, that this would be a long-term solution that could easily take a year to implement. Given the delays already associated with this amendment, there would likely be little support for further delays.

Other specific issues discussed included:

1. More limited southern extent of the Atlantic cod egg and larval maps. The PDT recommended keeping the proposed maps (limited by 38°N) due to the fact that, based on a long time series of survey catch data, the migratory range of adult cod extended as far south as New Jersey.
2. Data for Atlantic sea scallop map (all life stages are combined). The proposed map is based on NMFS scallop dredge survey data (limited to the area south of Cape Cod), Maine inshore trawl survey data, and areas in the offshore GOM that were filled in by the Committee. Use of NMFS trawl survey data was suggested because it would provide a more reliable method for determining areas of high scallop density and suitable habitat in the GOM. Given that 100% of the scallop survey data were used to define the spatial extent of EFH (i.e. EFH amounts to presence/absence for the species), a PDT member suggested that 100% of the distribution of another survey (SMAST video survey for the entire region) could be used as well. The PDT will explore additional data sources and develop a new designation alternative to the HC.
3. Currently adult and juvenile haddock maps are combined to produce the adult haddock map because the Committee concluded that the spring and fall adult survey data did not adequately represent the inshore distribution of adult haddock in the GOM in the summer. The available information does not completely support this reasoning, so the PDT suggested that the Committee reconsider their choice to use the combined map for haddock adults, or to do a better job justifying their decision if the combined map is used.
4. The proposed larval redfish map doesn't use MARMAP larval survey data (because it is 'patchy'), only juvenile trawl survey data and an assumed depth-based distribution for juveniles and adults along the continental slope. After reviewing the available information, the PDT suggested adding the MARMAP data to the Alternative 4 map for adults (100% of the range) map as an improved alternative. They also recommended limiting the southern extent of all the redfish maps at 37°38'N, which is the southern extent of their range.
5. Red hake egg and larval maps are based on juvenile survey data, although MARMAP data for larvae were available. The proposed map covers nearly the entire NE region even though red hake spawn south of Cape Cod, so the PDT recommended using MARMAP larval data for these maps, consistent with other species. There is no available survey data for red hake eggs, so the best option is to use the larval distribution as a proxy for eggs.
6. The egg and larval survey data for white hake are unreliable, so the proposed map relies on the juvenile distribution, which is mostly in the GOM. However, white hake spawn on the continental slope, so the PDT recommended using the off-shelf portion of the adult EFH map (400-900m) to map EFH for the eggs, and not designating EFH for larval white hake at all because of inadequate information.
7. The HC decided to use juvenile witch flounder as a proxy for adults because the adult distribution does not come close enough to the coast in the GOM, but there is plenty of adult survey data, and the minimum depths for adults and juveniles are not the same.

Neither life stage is very common in the inshore GOM. The PDT recommended using the adult map (alternative 3D), rather than using juveniles as a proxy.

8. The 20 m maximum depth limit for winter flounder eggs and larvae is deeper than the status quo depth limit of 5 m. Given that 20 m is based on additional/better information, the PDT agreed that it seems justified. Although more recent data show a greater number of eggs in shallower water, 1999-2005 data from NY harbor show no real difference in egg density between shallower and deeper stations. At the next PDT meeting, updated egg data from the ACOE will be evaluated so that the PDT can agree on a recommendation for the committee. The PDT will also review some additional information for Chesapeake Bay that may require further modification of the proposed maps for this species.

Deep sea coral work - update (Day 2)

Staff noted that there was a deep sea coral data meeting in Silver Spring during the week of July 19. Once the northeast data set is complete, the PDT will be using it to define coral zones. After important coral areas are identified based on this data, the next step will be to evaluate which fisheries/gear types have significant overlap with the coral areas, and then all of the information will be presented to the committee to inform coral protection management alternatives. Defining these areas and drawing boundaries will be a non-trivial exercise because of limitations in the underlying data set. Much of the data indicates presence only, although some data sources have density information, and there are many unsurveyed areas. In addition, while some of the data are recent, many samples could be considered historical.

The team discussed forming a small subgroup (Bachman, Stevenson, Packer, Auster, Hoff; cc Kray, Demarest) to examine the dataset and work on identifying coral areas. Chad and a contractor at Woods Hole are working on a project to cross-validate observer/VTR/VMS data, and will then use this dataset to compare fishing vs. coral locations. More coarsely aggregated SASI area swept data by gear type also covers the various coral areas. Council staff will follow up with DSCRTP staff regarding database access.

Gear modifications (Day 2)

As has been noted at previous meetings, options for minimizing the adverse effects of fishing on EFH include area closures, gear restrictions/modifications, and effort reductions. Given varying degrees of confidence in the underlying data in certain locations as compared to others, gear modifications vs. closures to certain gear types may be recommended. While the PDT did not discuss the merits of closures vs. gear modifications for specific areas, they did discuss two specific modifications for trawl gears, roller gear size limits and ground cable size limits.

There are two mechanisms via which a change in roller gear size might affect seabed impact. First, larger or smaller rollers are likely to alter the direct seabed contact of the gear, which could change the quality of the gear impact on structural seabed features. Many of these issues were discussed earlier on in the development of SASI specific to the vulnerability assessment, and the team was reminded that there is considerable uncertainty in terms of how different gear

configurations contact the seafloor (which is why the vulnerability assessment was not disaggregated by trawl configuration or trawl component).

The team discussed that the middle of the sweep has different contact with the seabed than the wings, and that rollers may behave differently depending on their position along the sweep. Specifically, due to the curvature of the sweep during fishing, rollers in the middle of the sweep will be more widely spaced, while they will be more closely spaced on either end of the sweep. In terms of rollers of varying sizes, it was noted that the rollers' effective weight in water is less than 100% of their weight at the surface. Also, wider rollers may better distribute the weight of the gear along the seabed, such that roller size could influence the penetration of the gear on the seabed and thus seabed impact.

Another mechanism via which seabed impact could be reduced is a roller gear restriction. This relies on the vulnerability assessment finding that adverse effects are greater on larger substrate size classes due to the structural features inferred to those substrates, and also on the assumption that restricting roller gear use to smaller sizes only would limit a vessel's ability to tow gear over those larger substrates. This would presumably avoid seabed contact in areas with larger grain sizes and redistribute effort into areas where the same amount of area swept would produce less seabed impact. In terms of developing and justifying roller gear restriction alternatives, this mechanism would be the PDT's focus, as opposed to any difference in quality of impact due to variations in roller gear size.

In order to investigate whether the distribution of fishing on certain substrates is influenced by restrictions on roller gear size, Chad Demarest examined the size frequency distribution of rollers on various trawl gear types (generic otter trawl, shrimp trawl, squid trawl) and their distribution relative to high Z_∞ cells inside and outside of the inshore GOM 12 in roller gear restricted area. In the memo prepared for the PDT, he noted that the one inch sweep diameter may represent null values, so he will exclude one inch and re-run the analysis after the meeting (as of this writing this work has been updated).

He found that a distribution of roller sizes were used for all three gear types, with successively smaller sizes reported from generic trawl to shrimp trawl to squid trawl. To test whether roller gear size varies by habitat vulnerability, he compared roller gear diameter in inches for tows conducted in high Z_∞ vs. low Z_∞ cells. These comparisons were only made for generic otter trawl and shrimp gear, as there were no observed squid trawl tows in high Z_∞ cells. For both gear types, there was a significant difference in sweep diameter between Z_∞ categories at the $p<0.0001$ level (although when the results were updated to removed sweep diameter = 1, shrimp trawl p value increased to 0.0565).

It was noted in the discussion that, "One may speculate that, based on the results of the Vulnerability Assessment, areas of high Z_∞ accumulation are more likely to contain high-relief substrates and fisherman chose to use larger diameter ground gear in such areas to minimize interactions between the bottom and their gear. Therefore it is possible that a reduction in roller gear size will result in changes in fishing locations such that high-relief substrates become less practicable for fishing. Countervailing this

is the potential for increased damage to bottom habitats due to fishing gear interactions if fishermen do not alter their behavior to avoid high-relief areas. Additional factors such as gear selectivity for target species are not considered here, but may be important for protecting habitat as regulations that render fishing less efficient will likely result in increased bottom contact time. As with area closure measures, the overall effect on habitat depends entirely on the slope of the relevant impact and catch curves."

The team discussed that there would need to be a clear basis for any gear modification measures enacted, and that there would need to be evidence to support that such a restriction would be effective in terms of reducing adverse effects. A team member asked why the 12" gear size was selected for the inshore GOM area, and wondered whether another size might have a larger influence on fishing behavior. It was also discussed that by enacting restrictions in one area, another area might experience increased fishing effort and thus increased adverse effects. Also, it was noted that factors other than large-sized substrates could influence the decision to use larger sized roller gear, for example if the fishing grounds had large sand waves, or if the vessel was targeting a particular species (e.g. haddock, which are generally not directly on the seabed but slightly above it).

Two suggestions for further analysis included: (1) Overlay mean roller gear sizes with bathymetry to determine reasons for larger gear in certain areas. (2) Overlay tow-by-tow fishing effort data from the observer program with highly resolved boulder reef locations (WGOM/SBNMS area), to try and replicate the effects observed by Bellman et al 2005 (i.e. changing fishing behavior due to gear size restrictions).

This led to a more general discussion of how to approach the evaluation of environmental impacts of adverse effect minimization measures. Questions included: (1) What do we use as a baseline (Amendment 13/10 time period?), and what are the goals (target Z values)? (2) Assuming a target Z value (either local or global) is selected, should this Z value be maintained, reduced? In terms of minimizing adverse effects, the team concluded that reducing area swept on vulnerable areas of the seabed is an important goal, and the analysis conducted should appropriately reflect any tradeoffs/opportunity costs.

The group also discussed ground cable length restrictions. The purpose of ground cables is to direct fish into the net, and the length of the cables can affect the size of the fish caught based on how they are guided into the mouth of the trawl. However, it was noted that the relationship between cable length and herding ability is not very well researched. Thus, although reducing ground cable length would reduce area swept and thereby reduce impacts to EFH, length limits could affect fish catches and thus have unintended consequences. Ground cable length is also related to fish size, and depth.

Finally, although they are very infrequently used for bottom trawls, the team briefly discussed how catch and habitat impact might change with the use of semi-pelagic trawl doors. Although unlikely to affect this management action, the use of semi-pelagic doors as a mechanism for reducing environmental impacts of fishing might be considered in the future.

SSC review – schedule and TOR (Day 2)

Habitat is on the agenda for the upcoming SSC meeting in August. In their January report, the SSC indicated that they would like to review applications of SASI before alternatives are fully developed. The team discussed whether 'application' was intended to indicate the use of the LISA analysis to evaluate the basic model outputs, or whether 'application' goes a bit further, and the SSC was thinking about how model-derived results like the LISA clusters would form the basis for management alternatives. An analogy was made to the SSC's involvement with catch limits: while the SSC sets ACLs, they do not specify the regulations that are used to achieve these catch limits. Similarly, with regard to SASI and EFH management alternatives, it seems appropriate for the SSC to weigh in on the appropriateness of the LISA technique, and on any limitations of the results that the PDT should consider when making recommendations to the committee based on the cluster analysis.

Specific to the LISA results, it was noted that true clusters are definitely outliers in terms of the distribution of $Z\infty$, but there is a risk that some true clusters are missing from the results due to limitations in the underlying data. In other words, it is unlikely that the identified clusters are not clusters (assuming the underlying vulnerability assessment is correct), but other areas should be considered carefully by the PDT and Committee if other information external to SASI supports taking management action in those locations.

The team discussed that it would be important to present the sensitivity runs as well as the spatial analysis methods and results at the SSC meeting.

Dedicated habitat research areas (Day 2)

Finally, the PDT discussed dedicated habitat research areas (DHRAs). While the PDT is in general very supportive of additional habitat-related research, it was not clear to the group how such research would be enhanced/facilitated by DHRAs, and what the purpose of DHRA designations might be.

Some points made by the team:

- Areas shouldn't be set aside for research alone unless work is being actively pursued
- Research areas should be proposed by research groups; this would be a more efficient way to proceed than for the PDT to make assessments about which areas might be desirable for research
- A better use of the PDT and Council would be to focus on research priorities; ideally, these priorities should be ranked
- At the conclusion of the amendment process, it seems likely that the mosaic of previously closed/recently closed/recently opened areas will provide adequate research opportunities
- Can a DHRA designation be used to streamline the permitting process, especially for vessels engaging in research that involves use of fishing gears in closed/restricted areas? (It was noted that proposals are typically red flagged if research was to be conducted in a habitat management area.)

- Multi-year and long-term funding opportunities are an important goal, especially given the need for recovery studies, where post-impact sampling should occur at various time intervals.
- Can existing funding mechanisms be improved?

In summary, the PDT did not reach any definite conclusions as to the utility of DHRAs vs. de facto areas that could be used for research, but did agree that the DHRAs would be useful if they could be leveraged to improve attention to research priorities, or facilitate permitting and/or funding opportunities.

The meeting concluded at approximately 4 p.m.