New England Fishery Management Council
Habitat/MPA/Ecosystems Oversight Committee Meeting Summary

June 10, 2010
Providence, RI

Committee members: David Preble (chair), Dave Goethel, Doug Grout, Jim Fair, Terry
                           Stockwell, Mark Gibson, Lou Chiarella
Council staff: Michelle Bachman (PDT chair)
NMFS staff: David Stevenson (NERO/PDT), Chad Demarest (NEFSC/PDT)
Others: Brad Harris (SMAST/PDT), approximately 15 additional audience
                           members, including many habitat advisors

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The meeting commenced at 9:30 a.m. with an introduction from the Chair. He stated that the purpose of the meeting was to generate preliminary alternatives for further analysis by the PDT and review by the Council. He envisioned a series of meetings throughout the summer to refine these options based on PDT analysis and advisory panel and public input.

He also acknowledged that a major goal for the meeting was to make some policy determinations related to:
- The degree to which gear modification and engineering is encouraged,
- The degree to which area swept reduction is encouraged,
- The desire to protect particular habitat types,
- The inclusion of cost benefit analysis in alternatives development,
- The use of habitat research areas, and
- The extent to which alternatives are intended to protect spawning aggregations.

He also noted some important points to bear in mind:
- Approximately 2/3 of the magnitude of adverse effect estimates relate to biological substrate/features, and 1/3 relate to geological substrate/features.
- Both swept area and realized adverse effect are far lower now than in 1996.
- It is important to carefully consider any management alternatives that close areas to certain types of gear, because when an area is closed it redirects effort into other areas.

Update on SASI model spatial analyses
The PDT chair, with assistance from PDT members Brad Harris and Chad Demarest, presented an overview of the spatial analyses conducted on SASI model outputs. These analyses formed the basis of the PDT's recommendations to the Committee. The methods were summarized in a short document 'SASI Spatial Analysis Methods'. Results and recommendations were

summarized in the memo 'Habitat PDT recommendations to Committee', and also in a Power Point presentation at the meeting.

Two types of analyses were presented: Local Indicators of Spatial Association (LISA), and Equal Area Permutation (EAP). These analyses were developed to answer two types of questions. First, the Local Indicators of Spatial Association (LISA) analysis shows which areas of the continental shelf are most vulnerable to fishing by particular gear types. This will help the Council to select priority areas for implementation of adverse impacts minimization measures such as gear restrictions. Second, the Equal Area Permutation (EAP) analysis will allow the Council to evaluate the extent to which current EFH closures or other management areas encompass habitats that are vulnerable to certain types of fishing gears. In cases where a particular area is relatively less vulnerable compared to other areas of similar size throughout the region, the Council may choose to eliminate that habitat closure. In other instances, maintaining an existing habitat closure area but changing its boundaries may better protect vulnerable habitats.

In the discussions below, $Z\infty$ (Z infinity) refers to the terminal year adverse effect (Z) value from each 100 km^2 grid cell of the SASI uniform fishing effort simulation runs. These values were estimated for otter trawl, scallop dredge, hydraulic clam dredge, demersal longline, sink gillnet, and trap gear types.

Committee discussion

    A committee member asked for clarification about the meaning of the 'Global Moran's *I*' statistic in the LISA analysis. Mr. Harris commented that this simply indicates high global spatial autocorrelation in the data, which was somewhat expected given that substrate- and energy-defined habitat types are highly clustered spatially, and that there is differential vulnerability of features inferred to each habitat type, such that $Z\infty$ was expected to be spatially clustered as well. He also noted that this result led to the selection of a 0.01 probability value, to be used as the basis for defining clusters of significantly high $Z\infty$.

Audience discussion

    Dr. Jon Witman (Brown University) noted that a smaller probability value in the LISA analysis leads to reduced chance of Type I error (i.e. reduced chance of clustering in areas where clusters do not truly exist), but increased chance of Type II error (i.e. increased chance of missing a cluster that really exists). He suggested looking at a wider range of probability values, and also asked whether post-hoc statistical corrections were used. Mr. Harris responded that he used two values, 0.01 and 0.05, to represent the two ends of the spectrum in terms of balancing concerns over Type I and Type II error. He noted that clusters generally expand by about one 100 km^2 grid cell in most directions when a 0.05 probability value is used instead of 0.01. The Committee Chair emphasized that the PDT and Committee will look at spatial areas defined by both probability thresholds, and that in terms of bounding management areas, there will be other considerations as well such as

enforceability. Post-hoc corrections are not being used, given the large number of samples (>3000), which results in an extremely large number of post-hoc comparisons.

Drew Minkiewicz (Fisheries Survival Fund) noted that the SASI adverse effect (Z) outputs are driven by area swept, and that management efforts to increase area swept should be considered as a mechanism for reducing adverse effects to EFH. The Committee Chair agreed with this statement.

Next, Mr. Demarest reviewed the Z Net Stock version of the SASI model. In April, the Committee asked the PDT to develop some practicability metrics so that alternatives could be evaluated in terms of both habitat impacts and impacts to the fishing industry. The Z Net Stock approach compares revenue at the trip level with the magnitude of the adverse effect (Z) estimated for that trip. To derive a total adverse effect for each trip, called "Z net stock", the magnitude of the adverse effect in each year is simply summed over the duration of those effects. That is, the adverse effects are summed for years one through x, with x being the year in which all adverse effects from that trip have recovered fully. This provides a variable for the stock of adverse effect that is commensurate with the stock of revenue created on each trip. Turning these two variables (Z net stock and revenue) into a ratio provides a rough approximation of the amount of revenue generated per unit of adverse effect, which in turn allows us to evaluate and compare the practicability of habitat management measures in various areas and for different gear types.

Finally, Mr. Demarest reviewed some recently completed sensitivity analyses (a summary document is posted at http://www.nefmc.org/habitat/sasi_info/100609_SASI%20model_sensitivity.pdf).   The first analysis tested sensitivity to the terminal recovery year assumption. Currently, a value of 10 years is used. When terminal R was set to 51 years, the magnitude of the adverse effect estimates increased, but the spatial distribution of high $Z\infty$ hotspots was very similar to the base case. When terminal R was set to 6 years, the magnitude of the adverse effect estimates decreased slightly, and the high $Z\infty$ hotspots shrunk slightly.

The second sensitivity analysis evaluated whether the tendency to avoid assigning S and R values of either 0 or 3 (vs. more commonly assigned 1 and 2) affected model outputs. When all S or R values of 1 were changed to 0, the outputs looked very similar. When all scores of 2 were changed to 3, there were shifts in the distribution of high $Z\infty$ clusters for trawl and scallop dredge gears from hard bottom/sandy/high energy areas to low energy areas along the shelf break. This likely relates to the relatively higher number of low energy biological features with S and/or R scores of 2 that were changed to 3 in the sensitivity model run.

The third sensitivity analysis related to the relative weighting of the geological vs. biological habitat components. Currently the weighting is 50:50; weightings of 90:10 bio vs. geo, and 90:10 geo vs. bio were tested. When the geological component was weighted more heavily, most high $Z\infty$ clusters remain the same, but slightly fewer model cells overall were more than 1.5 standard

deviations from mean $Z\infty$. When the biological component was weighted more heavily, again, the clusters remained similar, but additional cells were more than 1.5 standard deviations from mean $Z\infty$.

Audience discussion

    Dr. Jon Witman (Brown University) referenced some modeling work that he had published in 2006 which suggested much longer recovery times than estimated in the SASI model for a rocky subtidal community at Ammen Rock in the Gulf of Maine. He planned to follow up with the PDT on this issue after the meeting.

PDT recommendations in response to Committee motions from 4/2/10

The PDT Chair presented a summary of the team's recommendations to the committee, based on the following motions:

(1) Evaluate the appropriateness of the current boundaries of the closed areas in obtaining the goals of the amendment using the SASI model simulated runs.
(2) Provide the committee with any suggested modifications to the boundaries of the existing closed areas that would better meet the goals of the amendment. This includes suggestions of any new closed areas and elimination of any closed areas.
(3) Evaluate boundaries of existing or proposed HAPCs in obtaining the goals of the amendment.
(4) Provide committee with any suggested modifications of the boundaries of the existing or proposed HAPCs that would better meet the goals of the amendment. This includes suggestions of any new HAPCs and elimination of any HAPCs.
(5) In existing or potential closed areas, provide the committee with an analysis of metrics to characterize the tradeoffs between habitat impacts and fisheries benefits.
(6) Provide a list of potential appropriate sites to protect deep-sea corals.

To address motion 1, the PDT used the EAP analysis. The PDT recommended that high percentile areas (greater than 90th percentile) are generally appropriate to obtaining the goals of the amendment; low percentile areas should be considered for elimination. The results for each area are listed in the table below. *Note: permutation results were not available for Closed Area II, Closed Area I, or the Nantucket Lightship Closed Area during the meeting, but were calculated subsequently and are shown here for completeness.*

The results indicate that the CAI N EFH closure, the CAI S EFH closure, and the NLCA EFH closures from Multispecies Amendment 13 should be considered for elimination. EFH closures in the Gulf of Maine, as well as the CAII EFH closure, are appropriate in the sense that they encompass habitats that are vulnerable to trawl gear relative to most of the same sized areas that could be created elsewhere in the model domain.

Table 1 – Trawl EAP results with tested areas, their size, $\overline{z_W^{\infty}}$ permutation percentile (P%) and number of permutation areas with $\overline{z_W^{\infty}} \geq$ than the tested area.

|	Closed Area	km²	AWM z∞	Sum z∞	P%	Areas with ≥ Mean z∞	99th %
		Tested area result			**Permutation results**		
Groundfish (Amendment 13) EFH Closed Areas	Cashes L. EFH GF	443	51.437	588.06	96.00%	400	57.661
	Jeffreys B. EFH GF	499	57.667	510.13	99.10%	90	57.101
	WGOM EFH GF	2272	50.114	1777.55	95.10%	490	52.63
	CAII EFH GF	641	49.425	844.79	92.20%	780	56.567
	CAI N. EFH GF	1937	45.186	1287.93	12.80%	8721	53.15
	CAI S. EFH GF	584	46.085	609.67	50.30%	4970	57.101
	NLCA EFH GF	3387	46.787	2205.24	56.80%	4320	51.884
Multispecies mortality closures	Cashes L. Closed Area	1373	48.505	1186.07	83.00%	1700	54.314
	WGOM Closed Area	3030	49.874	2362.75	94.70%	530	52.037
	Closed Area II	6862	46.338	4354.63	*41.10%**	*5891**	*50.912**
	Closed Area I	3939	45.891	2556.1	*34.20%**	*6581**	*51.589**
	Nantucket Lightship	6248	46.466	4002.39	*46.30%**	*5371**	*51.015**

*These results not presented at meeting

To address motion 2, the PDT used the LISA analysis. The team recommended that the committee consider implementing measures to minimize adverse effects of fishing on EFH in the locations identified by the LISA analysis of the SASI model uniform simulation runs for trawl and scallop dredge gear (trawl and scallop gear were selected since they have the highest level of adverse effect – aside from hydraulic dredge gears, the use of which is more limited spatially. Also, many of the areas identified in the fixed gear analyses overlapped with the trawl and dredge analyses). These include the following locations identified as clusters of high vulnerability cells at the p<0.01 significance level (with some additional areas identified at the 0.05 level):

1. South of Mt Desert Island Cluster
2. Jeffrey's Bank Cluster (trawl only)
3. Platts Bank Cluster
4. Cape Neddick Cluster
5. Georges Shoal Cluster
6. Great South Channel Cluster
7. Brown's Ledge Cluster (southwest of Martha's Vineyard)

The figure below shows these clusters for trawl gear. The model domain is cropped to better show their locations. The areas outlined in black are the Amendment 13 EFH closures.

Map 1 – Maps of z_∞ clusters (high-high and high-low only) for trawl gear
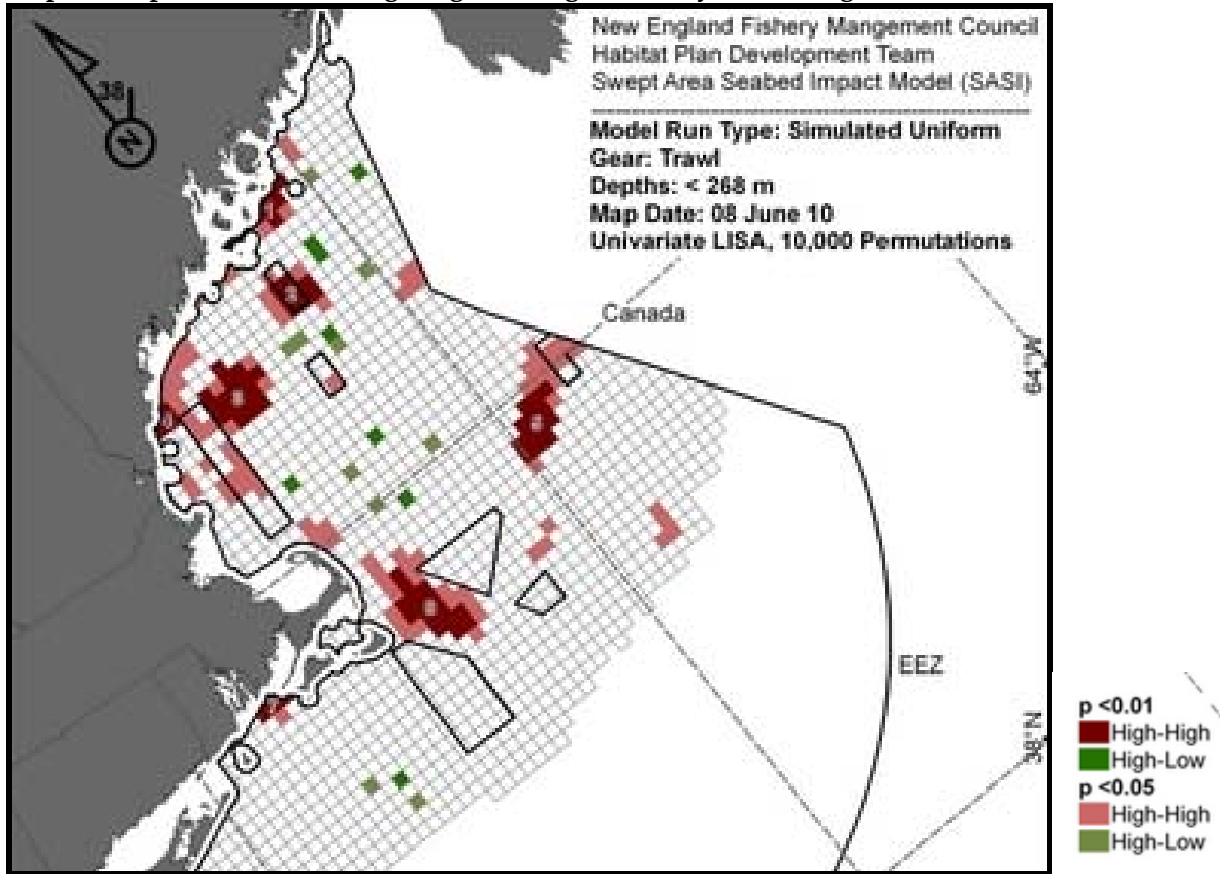
The Council approved a series of Habitat Areas of Particular Concern (HAPC) during Phase 1. Motions 3 and 4 asked the PDT to comment on whether these proposed HAPCs should be reconsidered or modified, and also to provide suggestions as to any new HAPCs. The PDT did not recommend eliminating the currently proposed HAPCs, and had no additional HAPC recommendations for the committee. Because the HAPC criteria are fairly broad, the PDT noted that they would require more specific guidance from the committee in order to make recommendations about new HAPCs.

Motion 5 asked the PDT to provide an analysis of metrics to characterize the tradeoffs between habitat impacts and fisheries benefits. The PDT recommended quantifying habitat impacts using Z (adverse effect) and fisheries benefits using revenue data from vessel trip reports (see Z Net Stock model summary above).

Motion 6 asked the PDT to recommend areas for deep-sea coral protection. The PDT has compiled information on deep-sea corals, specifically, (1) their vulnerability to fishing (see summary in SASI Part 1 document), (2) their distribution, and (3) the overlap between their distribution and the distribution of fishing effort (realized area swept data). This information will be used in the coming weeks to generate a list of areas that might be suitable as coral

protection zones, which may or may not overlap with proposed canyon and seamount HAPCs. These recommendations will be forwarded to the Committee at their next meeting.

Committee discussion

A committee member pointed out the overlap between vulnerable and high value areas in the Gulf of Maine, and noted his concern with wholesale area closures as an EFH management tool. Another committee member asked about the size of the Platts Bank cluster. Mr. Harris responded that the cluster appears larger than the extent of the bank due to the paucity of usSEABED samples surrounding the video survey samples in that location. This led to large unstructured grid cells classified as boulder around the edge of Platts Bank, and thus a larger LISA cluster, as boulder habitats are more vulnerable than mud habitats. Another question related to the fact that the WGOM closure does not cluster in the LISA analysis. Mr. Harris responded that much of the WGOM has been extensively sampled by grab samplers, and that most of the samples were classed as sand or mud. Although there is some data on larger grain sizes from the video survey, since every sampling point received equal treatment during formation of the unstructured grid, the average grain size in the area is artificially low.

The committee adjourned for lunch around noon.

New Committee tasking motions given PDT recommendations

Upon returning, the committee reviewed the realized area swept and realized adverse effect maps.

Then, they passed two multipart motions to further task the PDT. After discussing these items in detail and listening to public comments, the committee made a third motion to recommend to the full Council that the Habitat Committee and PDT's work plan include development of the concepts discussed. Note also that Item 3 under Motion 1 and Item 4 under Motion 2 were added by friendly amendment after the original motions were drafted, based on group's discussions. The motions as passed are as follows, with all discussions summarized below the motions.

Motion 1 Gulf of Maine (Stockwell/Grout)

1. Status Quo.
2. Keep all current areas closed and propose four new habitat management areas for the south of Mount Desert Island Cluster, Jeffreys Bank Cluster, Cape Neddick Cluster, Platts/New Ledge Cluster.
   a. That the size of these areas be identified in areas bounded by straight lines with three options – clustered squares where p=0.01, p=0.05, or 90% of p=0.01.

    b.   Management options to include a range of alternatives from complete closure to gear modifications such as reduced rockhopper size and shortened legs for trawl vessels, and appropriate measures for other gears.

    c.   Request PDT to further analyze grid cells in the WGOM and CL closures that don't cluster in the LISA analysis.

    d.   Propose that the Ammen Rock area (Cashes Ledge) and the Sliver (overlap between SBNMS and WGOM closed area) be dedicated habitat research areas.

    e.   Propose that the analysis of all alternatives proposed for the GOM include CPUE for both revenue and landings.

3.   No closure alternative to reduce Z (adverse effect) by maximizing CPUE in areas indicated by SASI.

Motion carried 6/0/0.

Motion 2 Georges Bank/Southern New England (Stockwell/Grout)

1.   Status Quo.
2.   Propose elimination of Closed Area I, Closed Area II, and NLCA habitat management areas.
3.   Propose new habitat management areas for the Great South Channel Cluster, Georges Shoal Cluster, and Browns Bank Area Cluster.

    a.   That the size of these areas be identified in areas bounded by straight lines with three options – clustered squares where $p=0.01$, $p=0.05$, or 90% of $p=0.01$.

    b.   Management options to include a range of alternatives from complete closure to gear modifications such as reduced rockhopper size and shortened legs for trawl vessels, and appropriate measures for other gears.

    c.   Propose that a 100 km^2 block in each of the areas proposed to be opened would remain closed as a habitat research area, as determined by the PDT.

    d.   Propose that the analysis of all alternatives proposed for GB include CPUE for both revenue and landings.

4.   No closure alternative to reduce Z (adverse effect) by maximizing CPUE in areas indicated by SASI.

Motion carried 6/0/0.

Audience discussion and committee responses

Gib Brogan (Oceana) asked whether an area determination criteria such as 90% of the $p=0.01$ LISA clusters is reasonable, statistically speaking. He also asked about reduced impact gears, and whether there could be different measures for trawls vs. reduced impact gear types.

Maggie Raymond (Associated Fisheries of Maine) asked the committee to expand on the further analysis it envisioned for the WGOM and Cashes Ledge areas. She recommended

considering areas that don't have high EAP percentiles for removal. Finally, she asked for clarification on what was meant by "the sliver"; staff noted that this refers to the overlap between the WGOM area and the Stellwagen Bank National Marine Sanctuary (SBNMS).

Ben Haskell (SBNMS) made a few comments specific to the WGOM/SBNMS area. He emphasized that models should be applied thoughtfully, and pointed out that some of the larger grain size sediments in the WGOM are underrepresented in SASI. He offered that the Sanctuary would be willing to convene an ad hoc working group to develop a mechanism by which to incorporate multibeam sonar-derived sediment data for the area into the PDT's evaluation. He also recommended that the sliver be considered as a dedicated habitat research area, noting that substantial research efforts have been ongoing in the area for many years now.

Ron Smolowitz recommended that the committee consider adding an option to consider reduced impact (reduced area swept) fishing as a habitat management measure, with no defined management area boundaries. The committee discussed that the addition of this option would result in a wider range of alternatives for the EIS, and then added part 3 of Motion 1 and part 4 of Motion 2.

Dr. Jon Witman (Brown University) supported Motion 1 part 2a, but recommended relaxing the probability value to 0.1 from 0.05.   He also supported Motion 1, part 2c, and stated that Cashes Ledge has species that are more susceptible with slower recovery values than currently classified. He also supported Motion 1, part 2d, particularly regarding Ammen Rock.

Dr. David Stevenson (NOAA NERO/PDT) encouraged the development of habitat research areas in locations that may be reopened to fishing (see Motion 2, part 3c).

A committee member wondered if there should be an alternative to remove all closures.

Mr. Demarest expressed concern that the alternatives were not organized properly from a NEPA perspective. The seconder of the motions acknowledged that it would be up to the PDT to develop appropriate wording and organization of the document.

John Williamson seconded Dr. Witman's suggestion to use a probability value of 0.1 in defining areas in the LISA analysis.

Regarding Motion 2, Dr. Stevenson asked the committee what the basis was for recommending the elimination of the CAII EFH closure, given that it fell above the 90th percentile in the EAP analysis. A committee member observed that the concept was to potentially remove it and then replace it with a larger area that better matches the LISA cluster. It was noted that the CAII EFH closure does fall largely within the 0.05 probability threshold.

The Council Chair asked for some clarification on Motion 1 part 2a and Motion 2 part 3a (defining areas based on clusters and probability thresholds). He thought that the Council might find these options to be somewhat confusing at this time, given the preliminary nature of the management options proposed. A committee member responded that the goal of the process is to draw enforceable straight boundaries around irregularly shaped LISA areas, and that the 0.01, 0.05, and 90% 0.01 options were intended to serve as guidance for the PDT.

Mr. Minkiewicz was supportive of adding in Motion 1 part 3 and Motion 2 part 4.

Mr. Brogan supported relaxing the probability criteria to 0.1, and also suggested larger research areas if the Georges Bank EFH areas are reopened, stating that 100 km^2 seemed much too small to be effective for research or enforceable.

Greg Cunningham (CLF) also suggested probability values of 0.01, 0.05, and 0.1 for identifying clusters.

A committee member asked whether the motions were intended to be tasking for the PDT or whether they were intended for formal approval by the Council as written. After a brief recess, the group reconvened and made the determination that the motions were intended to be put before the Council as Committee motions, but that they were primarily intended as tasking for the PDT. The purpose of discussing the motions at the Council level is to determine whether the Council generally agreed with the direction the Committee was taking. It was noted that the areas suggested for further analysis at this time may be subject to change, and that the options were not all-inclusive at this stage in the process.

Motion 3 (Stockwell/Grout)

Recommend to the Council that the Habitat Committee and PDT's work plan include development of the following concepts [Motions 1 and 2].

Motion carried 6/0/0.

The meeting adjourned at approximately 4:30 p.m.