New England Fishery Management Council
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DRAFT Research Steering Committee
August 6, 2009
Radisson Hotel, Plymouth, MA
Meeting Summary

The Research Steering Committee (RSC), chaired by Council member David Goethel, met on August 6, 2009 at the Radisson Hotel, Plymouth, MA. Other committee members present at the meeting included Council member David Preble, fishermen Curt Rice and Richard Taylor, Michael Pol of the MA Division of Marine Fisheries and Dr. Fred Serchuk from the Northeast Fisheries Science Center (NEFSC). Additional RSC members attending the meeting were Dr. Bill DuPaul, of the Virginia Institute of Marine Science and David Beutel, fisheries and aquaculture coordinator at the RI Coastal Resources Management Council. Dr. Teresa Johnson joined the committee to assist with reviewing the social science projects, and New England Fishery Management Council (NEFMC) staff member Patricia Fiorelli attended.

The audience included Carolyn Woodhead of National Marine Fisheries Service's (NMFS) Cooperative Research Program (CRP), as well as Ryan Silva from the NMFS Regional Office and Rachel Feeney from the Northeast Consortium. Principal investigators who attended were Dr. Shelly Tallack, Gulf of Maine Research Institute with colleague Dan Salerno; Dr. Madeleine Hall-Arber of MIT, Dr Ray Grizzle and Chris Gurshin from the University of New Hampshire, and Dr. Dan Georgianna from UMass in Dartmouth, MA.

Overview of Agenda

The following agenda items were addressed during the meeting:

- A brief overview of the status of NCRPP funding for cooperative research
- Management review of 12 CRP and Northeast Consortium final reports

Update on CRP Activities

Ms. Carolyn Woodhead briefed the RSC on a final report produced by NMFS following an east coast strategic planning exercise. The report identifies cooperative research priorities and directions for 2010-2014. It can be found at http://www.nero.noaa.gov/StateFedOff/coopresearch/CR_NE_StratDir2010-14Final.pdf. Ms. Woodhead also reported that the agency published several solicitations, all of which have now closed. A number of projects will be on a fast track for implementation this fall.
The solicitations addressed the following topics:

1. Industry-based fishery independent fixed gear surveys that will assist in filling data gaps;
2. Enhanced stock monitoring supporting the management transition to allowable catch limits and sectors; and
3. Expanded conservation engineering studies with an emphasis on by-catch reduction and industry assistance in adopting new technology.

Final Project Reviews

The Research Steering Committee reviewed 12 final reports related to cooperative research. As outlined in the Council's Research Review Policy, the RSC is charged with reviewing final reports that are generated through cooperative and possibly other research activities in the Northeast Region and providing advice on whether results may be acceptable for consideration in the management process. The committee recommended that all reports be used as appropriate by the Council's oversight committees and PDTs with the exception of two. One was missing a complete final report, a situation has since been rectified. In another report, the information provided was not considered robust enough for the Council to consider management changes to the Great South Channel scallop dredge exemption area for scallop general category vessels (see attachment for complete reviewer comments).

a. ***Employment, income working conditions and vessel safety in New Bedford,*** Dr. Dan Georgianna of UMass Dartmouth and Debra Schrader, Shore Support in New Bedford, MA; funded by the Northeast Consortium – $102,731.

Project Summary

The report discusses the socio-economic impacts associated with implementing a major revision to the rules governing the harvest of New England groundfish on the fishing industry in one of the region's major ports. Data was collected from fishing crews, settlement houses, and NOAA's Northeast Fisheries Science Center.

As described by the authors, the study offers evidence that supports the economic decline for New Bedford's dragger fleet described in the Environmental Impact Statement (EIS) for Amendment 13 to the Multispecies Fishery Management Plan. The EIS predicted a 40% reduction in DAS per year. Between 2002, the first year of the Interim Rule preceding Amendment 13 and 2005, the year after Amendment 13 was implemented, the number of offshore draggers that identified New Bedford (or Fairhaven) as their home port declined, reducing the employment of fishermen in the offshore dragger fleet. Average net crew share and average income of fishermen also declined for vessels in New Bedford's offshore dragger fleet, but crew members' average watch time on deck increased.

RSC Comments

Committee members agreed with reviewers that the work was informative and useful, and also agreed that, although intuitive, the conclusion that Amendment 13 to the Northeast Multispecies caused changes in employment requires empirical modeling. The PI explained there was some work on this issue after the project was completed that was not included in the report.

The committee agreed that more work on the socio-economic dynamics of fisheries should be encouraged, in particular follow-up efforts to evaluate changes after implementation of a management action. The PI suggested expanding the information requested in fishermen's VTRs, or perhaps other more efficient method, to capture information on crew, number of accidents at sea, and other relevant information that could be made available to social scientists.

b. ***Institutionalizing social science data collection,*** Dr. Madeleine Hall-Arber of MIT, David Bergeron of the Massachusetts Partnership, and Dr. Bonnie McCay of Rutgers University in addition to industry and scientific collaborators; funded by the Northeast Consortium – $113,700.

Project Summary
The "Community Panels" project explored the potential for community-based data collection and analyses to address the scarcity of social science data in New England fishing ports. Relying on suggestions from an advisory group, panels of 10 to 12 individuals, representing a cross-section of the fishing industry and associated communities, were established in three ports, Jonesport/Beals Island, ME; Gloucester and Scituate, MA. The panels each identified issues of concern to their port, sought data through meetings and interviews, and drafted a report of their results. In order to have a basis for comparison among the three ports, each considered infrastructure needs as one of their topics of concern. The authors felt that the panels proved to be a useful starting point for eliciting community responses to change and providing information useful to management.

RSC Comments
Committee members took note that the final report reflected on the Northeast Consortium-funded component of the project only. Members agreed with the technical reviews concerning the issue of using the panels during a one-time effort in lieu of the development of an effective on-going data collection program. The committee agreed that more systematically collected information would be more helpful in management decision-making, although the information collected was informative. The committee appreciated the efforts of the PI with respect to sharing "lessons learned" and as well the efforts of the panel participants who provided the information.

c. *Charting anecdotal information and oral histories on Stellwagen Bank from local commercial fisherman,* Dr. Madeleine Hall-Arber of MIT, David Bergeron of the Massachusetts Partnership, three other MIT scientists and six commercial fishermen; funded by the Northeast Consortium - $84,550.

Project Summary
The goal of this project was to document the extent and value of fishing activities on Stellwagen Bank over three decades and to see how this may have changed over time. Specific objectives were to involve fishermen in the data collection, charting and analyses used to develop charts that depicted seasonal fishing grounds by gear sectors, target species, economic value, and sea floor characteristics, and to build working relationships among the commercial and recreational fishing and scientific communities.

High-resolution charts were developed that depict seasonal fishing grounds by gear sectors and target species. Interviews elicited information about the significant economic value of fishing on the Bank to multiple fishing sectors and obtained some information about sea floor characteristics. The project found that the combination of charts and interviews were an extremely valuable, non-threatening method to obtain and information of interest to both the fishing industry and to managers. According to the authors, the project accomplished the goal of documenting the patterns associated with three decades of fishing on Stellwagen Bank by commercial and recreational fishermen. Clusters and patterns could be discerned for different gear types and target species.

RSC Comments
Members generally agreed with the technical comments provided, adding that this and other reports like it would prove useful in looking at restricted or special access areas, marine spatial planning efforts, MPAs, etc. They felt all Council committee's and their PDTs might find the information useful, although the project may not be a complete picture of all of the fishing effort occurring on Stellwagen Bank during the period considered. Committee members used this

discussion to highlight the question of what additional information should be collected through the NMFS data gathering programs, such as the study fleet, IBS projects, etc.

d. ***Staying Alive: Promoting a culture of safety at sea in New England's fishing industry***, David Bergeron and Dr. Madeleine Hall-Arber, MA Fishermen's Partnership (MFP); funded by the National Marine Fisheries Service - $124,440.

Project Summary
This project built on New Bedford's successful safety-training programs, extending the benefits of easy access to training and building an ethic of safety at sea to fishermen not only in New Bedford and Gloucester, but several of the satellite ports in the Commonwealth. The participation of the Massachusetts Lobstermen's Association, Plymouth Lobstermen's Association, Mass Bay Groundfish Fishermen's Association, Provincetown Fishermen's Association, Gloucester Fishermen's Wives Association, and other MFP member organizations as formal outreach partners for this project attracted fishermen who had not been well-represented in safety training courses in the past. Three-hundred-seven fishermen (307) participated in the training sponsored by this project.

RSC Comments
Members agreed the project was very useful as well as successful and, but commented that the PIs may not have achieved all of their proposed objectives, although additional information was provided in an accompanying journal article. They agreed that documentation of the progress achieved by the industry was helpful and supported further investment in projects that address the issue of safety aboard fishing vessels.

e. ***An atlas-based audit of fishing territories, local knowledge, and community participation in fisheries science and management***, Dr. Kevin St. Martin and Madeleine Hall-Arber; funded by the Northeast Consortium - $168,953.

Project Summary
The purpose of this project was to produce a digital atlas and Geographic Information Systems (GIS) database for the Gulf of Maine and Georges Bank. The atlas, still in development, focuses on the social geography of the region and was produced in cooperation with fishermen and community-based researchers. Areas of primary fishing effort by community were mapped and characterized using National Marine Fisheries Service data. The maps formed the basis for interviews with fishermen who worked in the locations defined by the maps. The interviews had two goals: the first was to verify and correct the maps; the second was to assess the range of environmental information available from fishermen and under what sorts of conditions they would be willing to share their information.

Given initial results, the PIs concluded that there are distinct and consistent "territories" used by fishing communities and/or gear sectors. In addition, fishing communities utilize and maintain significant local knowledge about such locations. This project documents these findings in the form of detailed maps and interview narratives. The authors maintain the results constitute a valuable resource for both fisheries managers/scientists and fishing communities.

RSC Comments
The RSC commented that this project was a very useful effort accompanied by good publications. Criticism focused on the absence of the atlas, the final product committed to by the PIs. Since the

RSC meeting, however, the Council has received the final report. It describes "a database of all valid vessel trip locations (linked to vessel principal port) by year derived from NMFS vessel trip report and permit tables. This database, originally developed for change analysis and for mapping the "most recent patterns" of fishing in the Gulf of Maine for the project, has been regularly updated and continues to be useful for mapping and change analysis. The tables are in an Arc GIS DBF format and currently reside on a secured computer at Rutgers University. Given the confidential nature of 11 individual trips and vessels, this dataset cannot be distributed in its current form. A website is under development that will allow users to query the data by an appropriate level of aggregation. From the database of trip locations, 43 unique maps were developed for the project".

Given the current availability of all of the information necessary to conduct its review, the RSC will complete its evaluation of this project at its next meeting.

f. ***Development of multi-beam sonar as a fisheries tool for stock assessment and EFH identification of groundfish in the Western Gulf of Maine***; Dr. W. Huntting Howell, UNH; funded by the Northeast Consortium as a proof of concept project - $24,820.

Project Summary
The purpose of this study was to prove the concept of using multi-beam sonar as a fisheries tool for studying the behavior and quantifying the abundance of groundfish. The focus of this research was to develop multi-beam sonar (MBS) as a fisheries survey tool. MBS can complement traditional narrow-beam echo sounder and trawl surveys because it has a large sampling volume, three-dimensional spatial description, and potentially fewer behavior-related sampling biases than traditional trawl surveys. Relationships between acoustic backscatter and fish biology need to be understood before reliable acoustic surveys using MBS can provide science-based information for stock assessments.

A series of acoustic and optical measurements were made using 38- and 120-kHz EK60 split-beam echo sounders and a 300 kHz EM3002 MBS. These were fixed to a surface platform over a 98 cubic meter submersible cage of 5-cm stretched mesh twine. After standard sphere calibration, the cage was stocked with 195 live Atlantic cod with a mean total length of 80.7 ± 0.8 cm (± standard error; range 51.5-105.0 cm) from nearby spawning grounds 10-15 km off the New Hampshire coast, USA. The sonars were synchronized to collect acoustic data on a captive population of mature cod of known size and number under video surveillance by two underwater cameras. Cod were incrementally removed from the cage to provide a time-series of acoustic backscatter at four densities (n=195, 116, 66, and 23). The authors stated that preliminary results demonstrate the feasibility of the EM3002 MBS to detect cod and show that quantification of the acoustic backscatter is possible.

RSC Comments
The RSC agreed the project was well-designed, with information provided in a well-written report and echoed the compliments included in the technical reviews. Members agreed the technique explored here would be useful to management once fully developed and encouraged further work in this area. Project participant Chris Gurshin briefed the committee on the additional work in progress.

g. ***Intensive study of the Western GOM Closure Area***, Dr. Raymond Grizzle, Jackson Estuarine Laboratory, Department of Zoology, UNH; funded by the Northeast Consortium - $397,515.

Project Summary
This project was an interdisciplinary investigation of the effects of the Western Gulf of Maine (WGOM) closure area. It represented the initial stages of a planned longer-term program to determine various ecosystem-level impacts of the closure. The focus of most of the NEC-funded portion of the project was on seafloor conditions in a 400 km^2 (150 mi^2) study area located along the western boundary of the closure, half inside and half outside. Following an initial multibeam sonar mapping effort that produced a 5-m pixel resolution bathymetric map of the study area, approximately 170 sites were sampled with some combination of box corer, Shipek grab and towed videography to characterize sediments, infauna and epifauna.

Bottom types ranged from mud sediment in deep water (>100 m) dominated by deposit-feeding infauna to hard bottom (gravel and boulders) in water <80 m dominated by epifaunal organisms. There were significantly ($p<0.05$) higher (up to 2.5x) density, biomass, and taxonomic richness (family level) for epifauna on rocky bottoms inside the closure compared to outside. Infaunal density and taxonomic richness were significantly ($P<0.05$) higher (up to 4x) inside the closure compared to outside, with the most differences in sandy sediments. These "in vs. out" differences in univariate measures were also reflected by differences in community taxonomic composition.

The authors state that, overall, these data indicate that removal of gillnets (mainly used in rocky habitats) and otter trawls (mainly used in soft sediment habitats) has allowed substantial recovery of seafloor invertebrate communities in some areas within the closure.

RSC Comments
Members agreed the report was complete, comprehensive and well-done. The exploration of gillnet impacts was particularly illuminating and prompted the committee to agree that such work raises questions for managers about balancing fisheries impacts with habitat protection. Members concurred with technical reviews, generally whish were generally encouraging with some criticisms, provided along with the final report.

h. ***An assessment of escape vent selectivity, bycatch and discard survivability in the New England fishery for deep water red crab,*** **(NMFS)**; Dr. Shelly Tallack, GMRI and industry partner Jon Williams; funded by NMFS - $100,198.

Project Summary
In summarizing the growth of the red crab fishery, the author states that the sustainable management of the deep water red crab fishery requires accurate stock assessment and modeling techniques capable of predicting the response of this resource to future exploitation, including the impacts on bycatch. In addition, the fishery requires fishing techniques capable of minimizing the impact of fishing operations on the undersized *C. quinquedens* and non-target deep water communities.

This project had three goals, 1.) Undertake escape vent trials as a means of minimizing the impact of handling and discard processes; 2.) Identify and quantify the bycatch – both target species and non-target species - from data obtained during commercial fishing operations; and 3.) Investigate

the survival rate of deep water red crab which experience being hauled from depth and returned to the sea floor; consider physiological, discard process and predation effects.

Results reported by the author are as follows. Escape vent trials were assessed during the 10-day research trip in May 2006; five different gear designs were assessed for relative catch composition between two depths (~600m and 3 ~800m). A large proportion of undersized crab are caught (~72-100%, depending on the trap condition and the market sized applied (i.e. 4" or 4.5"). The medium-sized ring (10cm internal diameter) is proposed as showing the optimum balance between catch of marketable vs. non-marketable red crab.

Bycatch data were collected during the escape vent trials. Bycatch of non-target species totaled 16 individuals out of a total of 450 trap hauls. This low level of non-target species in the catch is consistent with past surveys during commercial red crab trips. Comparison of the current study's data with earlier fishery-dependent data is confounded by small datasets and temporally discrete sampling periods. Nonetheless, an underlying trend is evident according to the author. The catch of undersized red crab can be high, as can the catch of non-marketable females. For the deep water red crab fishery, the primary bycatch problem appears to be that of non-marketable target species; the fishery is "clean" in terms of its impact on non-target species.

A variety of experiments were initiated to assess the survival rate of deep water red crab which are hauled from depth and are then returned to the sea floor. The overall finding was that ~5% of red crab assessed in this study died. It was shown that both higher impact handling techniques (e.g. 'dropped' vs. 'slid' crabs) and multiple haul frequencies (representing multiple capture events in a single trip) are likely to increase the discard mortality rate in deep water red crab.

RSC Comments
Most of the committee agreed the report was well done, although some details of the study design were considered difficult to discern from the report. Members added that an estimate of discard mortality would have been useful. A follow up study was recommended as a useful exercise that would provide more context for the information in the current report since some of the circumstances of the fishery (size of crabs harvested) have changed. Further studies should focus on an optimal size and shape for rings and a minimum crab size. The committee recommended forwarding the report to the Red Crab PDT with the caveats discussed by the RSC and included in the generally positive reviewer comments attached to the report.

i. ***An industry-science partnership investigating the short-term and long-term discard mortality of spiny dogfish using hook gear in GOM waters***, GOM Research Institute, Shelly Tallack and Lara Slifka, CCCHFA; funded by the Northeast Consortium - $167, 970.

This collaborative project represents a partnership between the Gulf of Maine Research Institute (GMRI), the Cape Cod Commercial Hook Fishermen's Association (CCCHFA) and commercial fishermen working with each organization in Gulf of Maine waters and Southern New England waters, respectively. The primary research objective was to investigate the short-term discard mortality rate of dogfish from different commercial hook gears. Survivability was investigated through caging studies.

A total of 2,418 dogfish were sampled between the two regions; of these 682 were caged by GMRI (45% males and 55% females) and 1,234 were caged by CCCHFA (27% males and 73% females). Dogfish were subject to three gear/handling treatments: 1) snubbed, 2) unsnubbed and 3) control. An overall regional difference in short-term discard mortality was observed; GMRI recorded significantly lower total mortality (7%) than CCCHFA (22%). Regional, averaged findings showed a sex effect with males demonstrating higher mortality (26%) than females (14%). The largest dogfish of each sex demonstrated greater resilience to mortality. Treatment effects were observed with mortality being highest in snubbed fish (23%), then unsnubbed fish (16%) and finally control fish (13%). Gear effects were found with highest mortality resulting from long-line gear (22%) while the different hand gear-related mortality ranged from 8-17%. The relationship between hook removal treatment and hooking severity index (HSI) was significant; severe mouth and jaw injury was most frequent in snubbed fish but was rare in control fish and the overall trend was that mortality increased with increased HSI.

Considerable variation was observed between the GMRI and CCCHFA findings; this variation was likely caused by differences in: water temperature, levels of parasitic infestation (i.e. sand fleas) and possible differences in handling, tanking and caging procedures. This study's long-term discard mortality assessments were aborted for logistical reasons and as such, these findings represent the range of likely short-term discard mortality from hook gears across the region.

RSC Comments
The RSC agreed that the key findings of this report included confirmation that some level of mortality is associated with all gear types as well as the levels of mortality (underlined in the above text). The committee also concurred with the technical comments provided by the Northeast Consortium.

j. ***An Evaluation of finfish bycatch rates inside the Great South Channel Scallop Dredge Exemption Area for the general category scallop fishery, Maggie Raymond****,* Associated Fisheries of Maine, Dr. Graham Sherwood, Laura Taylor Singer and Catherine Salerno, GMRI; funded by the National Marine Fisheries Service - $308,259.

Project Summary
The overall goal of this project was to provide managers and fishing communities with information to manage scallop and finfish resources in the Great South Channel Dredge Exemption Area (GSCDEA) with less uncertainty and greater stakeholder confidence. Objectives included describing current catch and bycatch rates for the general category fleet in the GSCDEA. Additional objectives included documenting and analyzing the quantity and composition of finfish bycatch in the study area, especially during the seasonal yellowtail spawning closures (April - June) to provide information unavailable from other sources. Other objectives included analyses of the quantity, distribution and maturity stages of yellowtail flounder in the area during the seasonal spawning closures. An examination of the species and size selectivity of 10-inch mesh twine top in a 10.5 foot scallop dredge was also attempted.

Field work for this project was conducted between March and September 2007 aboard three commercial fishing vessels using scallop dredge gear typical of the general category scallop fishing fleet. A total of 53 days of sampling were accomplished inside the GSCDEA for a total of 244 tows. Field sampling for the month of March covered the entire GSCDEA in an attempt to assess the whole GSCDEA for suitable sea scallop bottom. Field sampling for the remaining

months focused only in areas which had commercial quantities of exploitable sea scallop biomass to reflect commercial fleet activity. Species and size selectivity information was collected on approximately 1/3 of the completed tows, by means of a small mesh cover net that captured the fish and other organisms that passed through the large mesh twine top.
Results from this study indicate that the addition of the GSCDEA to the list of current scallop dredge exemption areas was an appropriate action. Sea scallops can be harvested from portions of the exemption area in commercial quantities using general category scallop dredge gear with very low finfish bycatch rates. Commercial quantities of sea scallops were found in waters ranging in depth between 20 and 50 fathoms. A total of 33,471 pounds of whole sea scallops were caught over the duration of the project. Sea scallop catch rates averaged 311 pounds per hour for months where sampling was focused on commercially exploitable sea scallop bottom. Analysis of scallop catch data indicated consistent sea scallop catch rates in the months of April – June. A decline in catch rates was observed in September possibly as a result of increased commercial scallop effort in the GSCDEA during the summer months.

RSC Comments
Several committee members had concerns with the use of three different dredge vessels, with three different dredge sizes and different twine top sizes and the lack of an extrapolation of impacts to fleet-wide impacts. Also, without information on swept area and towing speeds, they felt that this missing information did not allow committee members to draw any meaningful conclusions. The RSC also felt that a gear diagram would have been helpful. These issues, along with a fair amount of speculation by the authors, led committee members to agree with the technical review, particularly its last paragraph, "It is premature to reconsider the yellowtail flounder spawning closures or revisions to the timing of these closures for the GSCDEA based on this study.

k. ***Design and test of grid devices to improve size and species selectivity in the Gulf of Maine multispecies trawl fishery***, Dr. Pingguo He, University of New Hampshire and industry partner Bart McNeel; funded by the Northeast Consortium - $356,886.

Project Summary
This project involved flume tank testing and sea trials of various grid devices to separate species of groundfish during trawling. The authors described methodologies and results from the tank tests and sea trials, and discussed the potential of selected devices and their application for use in the Northeast multispecies fishery.

Three main types of grid devices were tested, high density polyethylene (HDPE), stainless steel, and plastic over steel roller grid. The 105 mm horizontal roller grid has potential for separating roundfish and flounders, while the 90 mm roller grid and the 90 mm diagonal grid have potential for size selective harvesting of monkfish.

RSC Comments
The committee acknowledged the conclusions of the author, that while a number of gear configurations were attempted, no effective gear modification was developed that allowed escapement of cod, while at the same time limiting the loss of harvestable flatfish. They also agreed with the technical evaluations --- the experimental design, development, testing of the gear was well done and well documented and the author accomplished his stated objectives. They also agreed with a statement that an analyses of the selectivity data would have been helpful.

l. ***Design and test of a topless shrimp trawl and a size sorting grid system to reduce finfish bycatch and small shrimps in the pink shrimp fishery***; Dr. Pingguo He, University of New Hampshire and industry partner David Goethel; funded by NMFS - $131,237.

Project Summary
According to the author, mandatory use of the Nordmore grid (grate) in the Gulf of Maine pink shrimp fishery has greatly reduced the finfish bycatch although it has not reduced the amount of small fish and shrimps that can pass through the 1-inch bar spacing of the grid. Nor are there means to release finfish at the front end of the trawl in addition to codend devices. One method is to reverse the use of over-hung netting called the "square" which is primarily used to prevent fish from escaping.

The PI removed the square and the top part of the netting immediately behind the square, making the trawl "topless". The topless shrimp trawl was designed and tested in a flume tank in Newfoundland, Canada. A full scale shrimp trawl suitable for a 45-foot inshore vessel was built after the flume tank test and post-test modification. Following three days of trials and adjustment (Phase 1), a five-day sea trial using the alternating tow method comparing the new topless net and a control net (commercial net) was carried out (Phase 2). The gear was subsequently adjusted in an attempt to reduce groundfish bycatch (Phase 3). During Phase 4, a size-sorting grid device was used with the topless trawl and was compared with the control net without a size sorting grid, but with a regular Nordmore grid.

RSC Comments
Committee Chairman David Goethel was a partner on this project and recused himself from the discussion, other than to provide background information. Vice Chairman David Preble chaired this portion of the meeting and crafted a consensus that the experiment was successful, and that the design and initial testing were appropriate and well done. Because of the project's promise, the partners plan to enter it into the Smart Gear competition and secure funding for future sea trials on a range of vessel sizes.