

A Mid-Course Review of the Strategic Direction for the Cooperative Research Program in the Northeast

**A Report to
NOAA Fisheries Service
Northeast Fisheries Science Center
Northeast Cooperative Research Program**



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Funding for this project was provided by the National Marine Fisheries Service (NOAA Fisheries Service), Northeast Cooperative Research Program. Initiated in 1999, the goals of this program are to enhance the data upon which fishery management decisions are made as well as to improve communication and collaboration among commercial and recreational fishery participants, scientists, and fishery managers. NOAA Fisheries Service works closely with the New England and Mid-Atlantic Fishery Management Councils, the Atlantic States Fishery Management Commission and the Councils' Research Steering and Set-Aside Committees, to set research priorities and integrate cooperative research data into science that informs management and reduces bycatch.

For further information on the Northeast Cooperative Research and the Research Set-Aside Programs, please contact:

National Marine Fisheries Service (NOAA Fisheries Service)
Northeast Cooperative Research Program

(978) 281-9276 – Northeast Fisheries Science Center, Cooperative Research Office, Gloucester
(401) 782-3323 – Northeast Fisheries Science Center, Cooperative Research Office, Narragansett
Laboratory

<http://www.nefsc.noaa.gov/coopresearch/>

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Executive Summary

The Northeast Cooperative Research Program (NCRP) and the Research Set-Aside Program (RSA), at the Northeast Fisheries Science Center (NEFSC), support cooperative research in both the New England and the Mid-Atlantic regions. In the spring of 2009, the NCRP completed a strategic planning process to define a clear set of strategic cooperative research priorities to inform the evolution of the NCRP from 2010-2014.¹ Significant progress has been made toward implementing the key recommendations of the Cooperative Research Strategic Plan. In particular, funding has supported industry-based surveys, enhanced biological sampling, increased electronic data reporting, and provided additional discard analysis.² Most notably, the NCRP has created a Conservation Engineering Network program to better coordinate research and align research projects with management needs.³

This report presents the results of a series of discussions among Council members, industry leaders, researchers, and other stakeholders throughout the Northeast to review progress toward the NCRP's 2010-2014 Cooperative Research Strategic Plan (Strategic Plan) and refine the priorities in light of current management needs. This report also addresses recommendations made by Preston Pate and Touchstone Consulting Group with regard to cooperative research in their April 2011 review of the New England Fishery Management Process.

In general, participants in the cooperative research strategic plan discussions were supportive of the direction of the Strategic Plan and the activities that have taken place in recent years. There was some concern expressed that the NCRP remain broad enough in research focus to accommodate a wide array of projects, while others provided ideas for targeting specific areas of focus. The most common issue raised by stakeholders was their desire for cooperative research to help improve stock assessments and reduce the scientific uncertainty in annual catch limit (ACL) calculations. Additionally, there were several suggestions made to address issues related to bycatch and analysis of discards.

The findings in this report follow along several themes, many of which are consistent with the analysis conducted by Preston Pate and Touchstone on the New England fishery management process. The following themes were articulated during the review of the cooperative research strategic plan and they reflect the current needs identified by stakeholders:

- **The fishing industry desires a greater understanding and role in the stock assessment process.** Fishermen would like to meet with scientists in small fishery-specific working groups early in the stock assessment process. They need to become familiar with the stock assessments, understand how data that they provide are used, and be invited to take a more proactive role in the stock assessment improvement plan.
- **Communication and outreach with the industry requires continual attention.** The industry wants to know more about how to get involved in cooperative research, what

¹ See http://www.nero.noaa.gov/StateFedOff/coopresearch/docs/CR_NE_StratDir2010-14Final.pdf

² See Appendix A for a list of recently funded cooperative research in New England and the Mid-Atlantic.

³ See Appendix B for a complete list and description of projects focused on conservation engineering in 2011.

research is being done, and, most importantly, how the results are incorporated into fisheries management plans.

- **Stakeholders are concerned about the accuracy of discard estimates and fishermen continue to seek ways to avoid bycatch.** The institution of ACLs and sector management has increased the incentive to avoid bycatch species while maximizing catch of healthy species. Many fishermen expressed concern about discard estimates and NCRP was encouraged to move beyond gear work and assist the industry with bycatch avoidance strategies.
- **Stakeholders encouraged NCRP to focus its efforts on data poor stocks, schooling semi-pelagic species, high volume fisheries, protected resources (turtles, sturgeon) and species of concern (river herring).** Fishermen raised concerns about a variety of specific species. The ideas ranged from predator/prey considerations to additional gear work to information on the effectiveness of closed areas.
- **Highly Migratory Species (HMS) has specific research needs that should be addressed by HMS managers.** There were a series of recommendations by stakeholders in the Mid-Atlantic specific to HMS.
- **The *Henry B. Bigelow* trawl survey is not well understood by the industry and additional outreach is needed.** The NEFSC fishery-independent trawl survey continues to receive significant attention by the fishing industry as the information is considered a critical component in determining the status of fish stocks. There remains a high level of frustration among some industry members regarding the survey methods and costs associated with running the new vessel.
- **There is an increased interest from the recreational community to be involved in the cooperative research process.** The 2010-2014 Cooperative Research Plan noticeably lacks specific recommendations for engaging with the recreational fishing community and this was seen as a major oversight, particularly in the Mid-Atlantic where there is a greater recreational fishing presence.
- **Community leaders are interested in designing socioeconomic and community development programs to support fishing communities.** Determining the social and economic health of the fishing communities, especially in light of recent management changes, was raised as an important issue for NCRP to consider.
- **There continues to be a need to foster upfront conversations among researchers, fishermen, and managers to align their expectations and to foster use of cooperative research results in management actions.** In addition, concerns were raised about the capacity of the scientific community to engage with the fishing industry on research of relevance to fisheries management. NCRP was encouraged to become more proactive in promoting the review of cooperative research results within the management process.

- **The fishing industry would like NOAA Fisheries to play a greater role in supporting marketing and public relations.** Although perhaps beyond the scope of cooperative research, there were participants who expressed concern regarding marketing of catch and NOAA Fisheries' role in improving the public's perception of US fisheries.
- **Stakeholders raised concerns regarding the NCRP programmatic issues, but these were not the primary focus of the discussions at the meetings.** The Pate report highlighted the issue of transparency with the grants and contract process, especially with regard to RSAs, yet these issues received surprisingly little attention during the cooperative research meetings. However, some suggestions were made to explore new methods of distributing research set-asides and improve the process. Permitting issues and concerns about the Letter of Acknowledgement process were also raised, but to a lesser extent.

The findings in this report are consistent with the Pate report. NCRP is widely regarded as a successful program that develops trust and relationships among fishermen, scientists and managers, and nobody during this review process suggested otherwise. The recommendations in this report reflect the need for ongoing improvement of a highly valued program as it responds to the evolving needs of the fisheries community.

The Northeast Cooperative Research Program has made tremendous strides in implementing the Strategic Plan. In the spring of 2009, additional resources were made available to NCRP to support sector management in the groundfish fishery and NCRP was poised to direct resources quickly to address the most critical research needs. The recent shift to annual catch limits, accountability measures, and sector management has increased the fishing industry's scrutiny of the stock assessments and heightened their desire to be more actively involved in all aspects of the process. The NCRP has a unique role in continuing to provide support to address many of the key issues facing New England and the Mid-Atlantic.

Background

The Northeast Cooperative Research Program (NCRP), which includes the Research Set-Aside Program (RSA), at the Northeast Fisheries Science Center (NEFSC), supports cooperative research funding in both the New England and the Mid-Atlantic regions. The NCRP has two core objectives:

- *Foster coordination, cooperation, communication and mutual respect among scientists, managers, and industry; and*
- *Enhance the data upon which fishery management decisions are made.*

The NCRP began in 1999 and uses funds from the Northeast and national cooperative research Congressional appropriations to support both internal (NEFSC) and external competitive awards for cooperative research. The RSA programs were established by the Mid-Atlantic and New England Fishery Management Councils (Councils) as components of specific fishery management plans that would provide a mechanism to self fund cooperative research and compensate RSA participant vessel owners through the sale of fish harvested under a research quota.

The NCRP works closely with the Councils in setting research priorities to meet scientific, management, and fishing industry informational needs. In the spring of 2009, the NCRP completed a strategic planning process to define a clear set of strategic cooperative research priorities to inform the evolution of the NCRP from 2010-2014.⁴ This Strategic Plan was reviewed and approved by the Northeast Region Coordinating Council (NRCC),⁵ providing broad institutional support for the recommendations provided.

The broad recommendations in the Strategic Plan include: focusing NCRP funds on management priorities; restructuring the program to increase coordination across institutions; expanding the involvement of NOAA Fisheries scientists and managers; using an array of funding mechanisms (contracts, grants, cooperative agreements) to increase the flexibility and efficiency of the program; and improving outreach and communication for NCRP initiatives.

There are two primary research themes proposed by the Strategic Plan. The first research theme encompasses the development and implementation of innovative monitoring tools to address data gaps. These include supporting real-time reporting systems to minimize bycatch, providing additional analyses of discard data, implementing pilot industry-based surveys, and increasing biological sampling for key species. The second research theme focuses on the development of a comprehensive conservation engineering program to achieve regional coordination of research efforts and assisting technology transfer to industry.

The Cooperative Research Strategic Plan was developed as an evolving plan that would be periodically reviewed and adjusted as management conditions change and new cooperative

⁴ See http://www.nero.noaa.gov/StateFedOff/coopresearch/docs/CR_NE_StratDir2010-14Final.pdf

⁵ The NRCC meets twice a year to discuss regional coordination/planning issues among the NMFS, New England and Mid-Atlantic Councils and Atlantic States Marine Fisheries Commission among the leadership of these organizations.

research needs arise. In April 2011, NOAA Fisheries received a report summarizing recommendations by Preston Pate and Touchstone Consulting Group following their review of the New England Fishery Management process.⁶ The Pate report highlighted the value of cooperative research as an effective tool for improving science and fostering trust between the NEFSC and stakeholders. The Marine Resource Education Program (funded in part by NCRP) was also mentioned as a successful program for educating stakeholders. However, the Pate report did suggest improving the collaboration between all of NOAA fisheries and external research organizations and increasing the transparency in the RSA process. In partial response to the Pate report, NEFSC launched a mid-course review of the Strategic Plan.

The NCRP held a series of discussions among stakeholders throughout the region to review progress toward implementing the Strategic Plan and to refine the priorities for the next 2-3 years. This report presents the results of those discussions. It is not meant as a complete revision to the Strategic Plan, but rather serves as an opportunity to assess the direction of the NCRP and make adjustments as needed to address the most critical issues currently facing the region. The specific recommendations provided were generated from the discussions with stakeholders and do not necessarily reflect the opinions of the facilitator and author of this report. Implementation of some of the recommendations will require coordination with other divisions within NOAA Fisheries and the Councils.

Overview of the Process

The Northeast Cooperative Research Program (NCRP) staff held meetings with the Mid-Atlantic and New England Fisheries Management Councils on June 14, 2011 and June 21, 2011 respectively. Meetings were also held with the New England Council's Scallop Committee (May 25, 2011), Groundfish Committee (May 26, 2011) and Monkfish Committee (June 1, 2011) to solicit input. The Council's 5-year priorities were reviewed along with committee research recommendations. In addition to the meetings with the Councils, a series of five public outreach sessions were scheduled to gather broad stakeholder input. Public outreach meetings were held in Portland, ME (June 21, 2011), Gloucester, MA (August 17, 2011), Hampton, VA (September 13, 2011), Barnegat Light, NJ (September 14, 2011), and Narragansett, RI (September 22, 2011). Earl Meredith of the NCRP staff facilitated the first two public outreach sessions and Laura Taylor Singer facilitated the remaining three public outreach sessions.⁷ Finally, individual groups of fishermen have been communicating regularly with NCRP staff during fishery specific meetings and they have provided additional comments on the Strategic Plan.

For each session, NCRP staff gave an overview of the 2010-2014 Cooperative Research Strategic Plan focusing on the major recommendations and research themes set out in the Plan. Participants were then given an update of the progress made toward addressing the recommendations. A list of NCRP and Research Set-Aside (RSA) projects funding in FY09 and

⁶ See http://www.nmfs.noaa.gov/publicreview/new_england_phase1/docs/02_fullreport_touchstonereport.pdf

⁷ NCRP staff and other NEFSC staff held additional stakeholder meetings in Cape May, NJ, Montauk, Pt., NY, Port Clyde, ME, and North Kingstown, RI. These meetings focused on concerns about squid, butterfish, and mackerel stock assessments and questions about survey trends relative to stock status determination. In Maine and Montauk there were more general questions about the update of the cooperative research program.

FY10 was also presented at the meetings.⁸ NCRP staff provided more detailed information on the Conservation Engineering Network projects awarded in FY10, and described some of the recent biological sampling and discard analysis projects undertaken by the NCRP Study Fleet research team.

Council members and the public were then asked to provide comments on the continued direction of the Strategic Plan for the next 2-3 years. During three of the facilitated public outreach sessions, the discussions resulted in a potential list of activities. Participants were asked to individually rank the list using a multi-voting process.

The public outreach meetings provided a forum for NCRP to outline the progress made toward the recommendations in the Strategic Plan and engage in a dialogue about current cooperative research needs. Members of the New England and Mid-Atlantic Fisheries Management Councils, Council committee members and a number of participating researchers from various institutions attended the Council associated evening sessions. However, the public outreach meetings had disappointing attendance with the exception of the meeting held in Barnegat Light, NJ.

⁸ See Appendix.

Recommendations – Broad Themes

Link Fishermen and Scientists with the NEFSC Assessment Process

Comments were made at every meeting about the stock assessment process - either directed at a specific species or as general observations. There is a lack of common understanding about the data that is used in the assessments and how the assessment process is conducted. Participants also lack trust in the quality of data being used in stock assessments. Written comments were also received that highlight the industry's frustration with gaining access to high level NEFSC scientists to collaborate on the stock assessments. In addition, scientists outside of the NEFSC who are involved in cooperative research asked for better guidance on how to work with NEFSC to integrate their data into the assessment process. Following are the recommendations related to these issues.

- Host a series of round-table discussions with high-level stock assessment scientists and key leaders of the fishing community to discuss ways to improve specific stock assessments and more proactively in the assessment process.
- Facilitate the development of species-specific fishermen panels to advise the assessment process perhaps by leveraging activities of Council advisory panels.
- Provide specific guidance to cooperative research partners on how to get data into the stock assessment process.
- Work with the observer program to develop mechanisms for industry to better understand how observer data is used, provide industry with better access to the data, and involve the industry in the quality control process of the data such as implementing an industry peer review of observer data with the analysts.
- Develop materials, forums, or other forms of communication to provide industry with feedback on how cooperative research data is used in the assessment process and the evaluation of management options.

Improve Communication and Technical Assistance

Despite efforts to increase the level of communication with the fishing industry and other participants in cooperative research, there is still a limited portion who understand the proposal process, who are aware of research underway, and who know who is doing cooperative research. As mentioned above, how the results are integrated into the management process is also poorly understood. Current methods of mailing and of using current e-mail lists are not reaching the entire target audience. Fishermen want NCRP to communicate more effectively and meet with them in the ports on specific problems. There are new opportunities to help support fishermen as New England continues to transition to sector management. The suggestions below should be considered to improve the NCRP's communication and technical assistance efforts.

- Use on-line forums, social media, and “dock-talk” to better connect with fishermen on collaborative research opportunities and results.
- Follow through on the outreach and education recommendation from the 2010-2014 Cooperative Research Plan: *“Develop and implement a coherent outreach and education strategy over the next year that increases regular interaction among NMFS scientists and stakeholders and makes industry and the general public more aware of the results of cooperative research activities.”*
- Create an easily accessible and updated list of research projects, researchers, and fishermen who want to become involved in cooperative research.
- Coordinate broadly with extension partners in the region, including academic universities, non-governmental organizations, and research institutions, to assist fishermen in the transition of their businesses to sector management.
- Increase the role for sector organizations to engage with cooperative research over time.

Foster Better Collaboration Among Fishermen, Scientists and Managers

The expectations of fishermen, scientists, and managers have some common threads and some major differences that are important to understand when engaging in cooperative research. In particular, stakeholders felt that scientists who work on cooperative research projects would benefit from greater familiarity with stock assessments, the fishery management process, and how fishing vessels operate. These issues were raised primarily in the Mid-Atlantic where there has been less experience with cooperative research, but the ideas below are applicable for both regions. In addition, NCRP was encouraged to become more proactive with the Councils in promoting the review and use of cooperative research results.

- Facilitate discussions on expectations of cooperative research partners upfront in the process to become better aligned, such as that instituted with the Conservation Engineering Network.
- Sponsor hands-on workshops to expose early-career scientists to the world of fisheries and fishing practices.
- Engage scientific community in discussions about collaborative research design and strategies.
- Continue to support and expand educational programs that promote meaningful dialog among fishermen, scientists, and managers such as the Marine Resource Education Program.

- Sponsor workshops among Council members and NOAA Fisheries staff to review the results of key cooperative research projects.
- Consider an expedited approval process of final reports for projects that are closely tied to critical management needs, such as gear-related projects.

Recommendations – Research Areas and Species Specific Research

Focus on Estimating Discards and Developing Bycatch Avoidance Strategies

The shift in focus to annual catch limits under the new Magnuson Act requirements and the allocation of catch by sectors in the New England groundfish fishery has intensified the need for more accurate accounting of discards. Although new gear designs have been developed, the NOAA Fisheries data management system has not been updated to better track what is working on the water. Many fishermen expressed concern about bycatch and NCRP was encouraged to move beyond gear work and assist the industry with bycatch avoidance strategies. Accurately identifying bycatch species, specifically skates, was also raised as an important issue in New England. There were several suggestions that should be considered to address these issues, many of which could be implemented through the Conservation Engineering Network. Some suggestions will require a coordinated effort among the NEFMC, the Northeast Regional Office, and the Councils.

- Develop and implement more effective means of identifying and tracking the use of selective fishing gears so that the performance of these specific gears can be better understood and communicated to industry and managers.
- Work with *Loligo* squid industry to develop and implement near real-time, daily reporting for locations of high butterfish bycatch, thereby helping industry avoid concentrations of unwanted bycatch species.
- Work with Mid-Atlantic flounder and skate trawl fisheries on developing a topless trawl or other gear modification to reduce turtle bycatch and work with the gillnet fishery to find a way to avoid sturgeon bycatch.
- Collect and disseminate information on the distribution and status of sturgeon as a bycatch avoidance strategy.
- Use fishermen to collect data for index of abundance for turtles and other species.
- Develop additional tools for fishermen and observers to accurately identify skate species.
- Explore the idea of creating a full retention fishery.

- Investigate the environmental drivers contributing to the shift in species dynamics.

Species Specific Recommendations

Fishermen raised concerns about a variety of specific species. The ideas ranged from predator/prey considerations to additional gear work to information on the effectiveness of closed areas. Some of the ideas generated below may not be appropriate for cooperative research, but they are included here to represent the concerns expressed.

Mackerel -

- Increase research on mackerel to better assess the status of the stock.

Sturgeon -

- Continue to support research on industry monitoring and tagging to improve sturgeon stock assessments.
- Add avoidance approaches to the gear studies currently underway. See above under bycatch avoidance.

Scallops –

- Investigate how rotational closures are both opened and closed, especially in relation to how yield changes along with product quality and age.
- Develop mechanisms to more actively manage scallop rotational closures and adjust to new data by making mid-course changes.
- Explore methods of scallop enhancement and aquaculture techniques.

Highly Migratory Species -

- Re-evaluate closed areas for effectiveness in longline fisheries, especially in light of the transition from a fishery that used J hooks to one that now can only use circle hooks.
- Explore alternative gears such as buoy gear for longline fishery.
- Explain how live releases are calculated in stock assessment data and fund survivability experiments to provide more accurate estimates.

Weakfish –

- Explore shift in stock dynamics with increases in predation by striped bass and dogfish populations, which is perceived to be eliminating the return of strong year classes to coastal bays as age 2 and 3 fish.
- Investigate, in particular, predator/prey interactions on the young of the year.

Lolligo –

- See above under bycatch avoidance.

Scup and Fluke –

- Enhance socioeconomic and market data and integrate into mid-year management actions.
- When increased ACLs are under consideration, explore the potential impact on the market and predict how the fishery may react.

Foster Better Understanding of the Henry B. Bigelow Trawl Survey

The NEFSC fishery-independent trawl survey continues to receive significant attention by the fishing industry as the information is considered a critical component in determining the status of fish stocks. During the meeting in Hampton, Virginia, the efficacy of using the new R/V *Henry B. Bigelow* to collect fishery-independent survey data was raised and resulted in the following suggestions.

- Fund a side-by-side comparison between the *Henry B. Bigelow* and NEAMAP
- Collect bottom contact information on the *Henry B. Bigelow* to assure the net is fishing appropriately during the survey.
- Conduct a cost-benefit analysis of using the *Henry B. Bigelow* versus using private vessels as a survey platform.
- Enhance outreach and education on what the *Henry B. Bigelow* is doing and how the information is used.

Expand Recreational Participation in Cooperative Research

The recreational fishing industry has historically been less involved in cooperative research projects. This is due, in part, to funding directives for cooperative research by Congress and the requirement to target specific resources within the commercial fishing sector, especially New England groundfish. However, there has been an increased interest from the recreational community to be involved in the cooperative research process, even if not as a direct platform. The NCRP should continue to more actively engage with the recreational community by advancing the following recommendations.

- Include recreational fishing interests in discussions about ways of reviewing the stock assessment data and more proactively involve the industry in the assessment process.
- Develop ways to use recreational platforms to support the collection of more accurate abundance information (CPUE) and improved discard mortality estimates for stock assessments.
- Consider duplicating West Coast study using charter vessels to more comprehensively sample inshore areas for data poor species.

Consider Enhancing Socioeconomic and Community Development Programs

Determining the social and economic health of the fishing communities, especially in light of recent management changes, was raised at several of the meetings. In particular, leaders within the community of Gloucester advocated for more research and development funding to create more business opportunities within the maritime community.

- Continue to collect socioeconomic data to investigate the impacts of sector management.
- Consider regional teams to address socio-economic information needed for Council Science and Statistical Committees and work with Sea Grant's current efforts in this domain.
- Provide more information and access to reports on economic impact of commercial and recreational fisheries for local communities.
- Use cooperative research projects as catalyst for research and development in the community.
- Assist Gloucester in developing additional academic or research capacity.

Explore Supporting Marketing and Public Relations Efforts

Fishermen and processors expressed concern regarding marketing of catch and NOAA Fisheries' role in improving the public's perception of US fisheries. Though perhaps beyond the scope of NCRP, as fisheries recover and annual quotas increase, these may be important ideas for NOAA Fisheries to consider.

- Consider spreading increases in landings quotas over the entire year, and increasing quotas gradually to help with re-establishing markets that can be too easily flooded with larger trip landings.
- Sustainability efforts being made by commercial fishermen need to be better understood by the public and used as a way to market US fish.
- Fishwatch (<http://www.nmfs.noaa.gov/fishwatch/>) needs to be kept current and promoted among the public.

Recommendations – Programmatic Issues

Continue to Work on Transparency within the Cooperative Research Funding Process and Explore Alternative Funding Strategies

Efforts have been made through the network process to increase the number of fishermen involved in cooperative research projects and a diverse distribution system for funding projects has also been maintained. However, the cooperative research community is perceived by some as an exclusive group of academics and fishermen who receive the majority of the funding. In addition, the NCRP supports several critical fishery independent data collection programs through multiple sources including Congressionally-appropriated funds and RSA funds and more stable resources outside of NCRP were suggested. The following specific suggestions were made.

- Establish an advisory committee to assist NCRP with the RFP and review process.
- Maintain diversity of funding mechanisms for cooperative research, including support of Northeast Consortium and Commercial Fisheries Research Foundation.
- Schedule a 3-year review of the network process to elicit lessons learned and assess the cost-benefit of this approach.
- Clarify for internal and external stakeholders how cooperative research priorities are established by the Councils through the RSA and RSC committees and consider ways to communicate research priorities from within NOAA Fisheries that are specific to fisheries management plans.
- Explore other methods of increasing the transparency of the award and contract process (within the limits of federal procurement methods).
- Explore using a quota set aside auction process in New England (as is used in the Mid-Atlantic) to generate more income to support cooperative research needs.

Review and Improve the Research Set-Aside Program

The RSA program is an effective means of funding cooperative research. Both the New England and Mid-Atlantic RSA programs have been reviewed and recommendations to improve these program are either implemented or under consideration. There were concerns expressed regarding the RSA process including selection of projects, the timing of awards, and the enforcement of RSA catch in the Mid-Atlantic region. Some additional recommendations include:

- Develop outreach specific to the recreational fishing community and explore new ways to incorporate the for-hire sector in the RSA process.
- Work with Mid-Atlantic RSA Committee and Enforcement to explore additional ways of tracking RSA through the use of trophy tags, dockside monitoring and/or other methods.
- Work with the Councils to better align the schedule of RSA grant process with the fishing season so RSA-caught fish can be sold during ideal market times.

- Consider using scallop RSA Model (review and funding processes) as a new approach for the Mid-Atlantic RSA program.

Contribute to On-going Work on Permitting Issues

A great deal of effort has been made to better coordinate and streamline the permitting process for cooperative research projects. There were, however, a few issues raised that bear consideration. Some participants in cooperative research remain frustrated by the slow permitting process and others raised concerns about the voluntary reporting procedures for projects that fall beyond the scope of the fisheries management requirements. There were two suggestions:

- Continue to work with the Regional Office to find additional ways to expedite the Exempted Fishing Permit process.
- Work with the Councils and the Regional Office to address concerns about the lack of oversight provided for third party research conducted outside of the NCRP research competition processes.

Conclusions

The Northeast Cooperative Research Program and Research Set-Aside Programs continue to evolve and respond to the research needs expressed by fishermen, scientists, and managers in the New England and Mid-Atlantic regions. There has been significant progress in advancing the key research themes recommended in the 2010-2014 Cooperative Research Strategic Plan. This rapid progress is due in part to NCRP's ability to target additional funding received in FY2010 for groundfish sectors on priority cooperative research projects outlined in the Strategic Plan.

The Strategic Plan makes several recommendations that address data gaps in stock assessments and many of these have already been supported through NCRP. Most notably, NCRP has funded work to analyze new information on discards in collaboration with the NEFSC Observer Program's at-sea independent observers, vessel captains, and other data collectors (e.g. Study Fleet technicians). Funding has been provided for industry-based monkfish surveys and ventless trap scup sampling. Additional pilot surveys to address critical data gaps in scup and black sea bass were also suggested in the Strategic Plan and are being explored. As recommended, NCRP has increased the species-specific biological samples for flatfish, skates, black sea bass and dogfish to answer emerging questions about population responses to ecosystem changes.

Significant cooperative research resources have also been used to advance the Study Fleet program and foster development of real-time management systems and communication networks. Once implemented, these tools can more accurately characterize discards through a more comprehensive fishery-dependent monitoring and reporting structure – a key theme that was repeated in the recent strategic planning meetings. The move to sector management in the groundfish fishery provides a new structure and potential new opportunities for NCRP to engage with the fishing industry. The role of sector managers and sector organizations in cooperative research may become more prominent in the future.

Although there has been rapid progress in advancing many of the recommendation in NCRP's Strategic Plan, there are ideas that have not been implemented yet are especially important to develop. Stakeholders continue to be unclear about the scientific process, particularly the assessment process, and the impact of cooperative research in fisheries management is not clear. There remains an acute need to develop and implement a coherent outreach and education strategy to both 1) increase regular interaction among NEFSC scientists and stakeholders in the assessment process and 2) make industry and the general public more aware of the results of cooperative research activities.

The Strategic Plan made several recommendations for improving the regions conservation engineering efforts and NCRP has made considerable progress in implementing these recommendations in the last two years. The Conservation Engineering Network has been created, which includes the establishment of an industry conservation engineering experts to guide gear research priorities and an administrative node at the Gulf of Maine Research Institute to coordinate the efforts of the network. Additionally, NCRP has been working with Sea Grant and other extension agents to facilitate transfer of successful gear technology to the industry for use. Beyond conservation engineering strategies that focus on gear development, stakeholders are now looking to NCRP to work aggressively with industry to enhance bycatch avoidance strategies.

NCRP has implemented a series of operational recommendations made in the Strategic Plan. NCRP has broadened its use of various funding mechanisms (grants, contracts, and cooperative agreements) by working with partners to distribute funding and has established more multi-year contracts and partnering contractual arrangements among various organizations. In particular, NCRP has continued to support the efforts of the Northeast Consortium and Southern New England Cooperative Research Initiative to maintain a diverse portfolio. This diversity of funding opportunities continues to be an interest to stakeholders. The administrative capacity of the program has also been enhanced to make the program more responsive, including redesigning the website and updating the cooperative research database. NCRP has also made considerable progress on streamlining programmatic regulatory permitting and NEPA/Protected Resources review processes that would expedite the field work activities.

NCRP has yet to formalize a standardized industry data management system to support survey programs (such as used by NEAMAP, Maine/New Hampshire, NEFSC, and MA-DMF). Such a system would facilitate the flow of information into the science and management arenas, as well as to disseminate survey results back to industry. Implementation should be expedited.

The Pate report found that the RSA program is not transparent to stakeholders. NCRP has worked to improve the RSA grant administrative processes. Further streamlining of RSA grants can be accomplished by Council actions, such as establishing multiyear specifications for RSA quota and finalizing annual FMP specifications sooner in the fishing year. A recent vote by the Mid-Atlantic Council to establish an RSA Industry Advisory Panel will better integrate the fishing industry into the Mid-Atlantic RSA program and hopefully address transparency concerns about the program. With the expansion of the Marine Resource Education Program into the Mid-Atlantic region, there will be more outreach and educational training opportunities to improve understanding of fisheries science and management, and thereby increase transparency

of all NCRP programs. The Mid-Atlantic Council also voted to include the Chair and Vice Chair of the Science and Statistical Committee to be ex-officio members of the RSA Committee. This will enhance the technical review capacity of the RSA program, improve the robustness of resulting RSA science, and better integrate RSA data into management actions.

The Strategic Plan made suggestions for enhancing the coordination of cooperative research activities within the fisheries agencies in the region and these suggestions have been implemented to varying degrees. The Northeast Cooperative Research Coordinating Committee has been formalized, but this committee of deputy-director level staff has not been engaged on a regular basis to help ensure responsiveness, coordination, and relevance of the cooperative research program. In addition, limited effort has been made to seek funding from other parts of NOAA to support the core long-term needs of the region (i.e. NEAMAP and inshore surveys) and NCRP has been unsuccessful at encouraging other parts of NOAA to leverage the significant cooperative research infrastructure and expertise available for projects that are not directly related to NCRP-supported programs.

The recent strategic planning meetings confirmed the general support of cooperative research in New England and the Mid-Atlantic and a desire by stakeholders for NCRP to continue its focus on many of the core themes in the Strategic Plan. These themes remain in line with current fisheries management priorities. This finding is consistent with the Pate report, which found that cooperative research is generally viewed as being positive and contributing to science and management in the New England and Mid-Atlantic areas.

The significant and rapid shift in fisheries management since the original strategic plan was developed is creating a greater sense of urgency among stakeholders to improve the timeliness and accuracy of data used in stock assessments. Fishermen clearly articulated that they want to develop new ways of engaging with the scientific community early in the assessment process and in more meaningful ways.

The NCRP has been shown to be an important program for the New England and Mid-Atlantic regions. Although this report includes recommendations for improving cooperative research in the region, these suggestions reflect further refinement of the themes in the 2010-2014 Cooperative Research Strategic Plan and do not suggest wholesale changes to the NCRP and RSA programs. As the fishing industry continues to adapt to rapid changes in fisheries management, cooperative research programs that link fishermen with scientists and managers become even more important to develop and expand.

Appendices

Appendix A: NMFS Northeast Cooperative Research Program, Commercial Fisheries Research Foundation, Northeast Consortium, and Research Set Aside Program Awards (FY09 – FY11)

September 2011

NEFSC NCRP Funded Projects

FY09 Competition

1. Are codend catch sensors a practical operational tool for sector quota management?
2. Bycatch, social and economic performance evaluation of RI State Fluke sector.
3. Topless trawl study for SNE and Mid-Atl summer flounder trawl fishery to reduce sea turtle bycatch.
4. Technology transfer and further research on alternative whiting trawl design with large mesh belly window in Maine whiting fishery.
5. Enhanced biological sampling and pilot survey for wolfish in inshore Gulf of Maine.
6. Design and testing of squid trawl with raised footrope rigging and a grid device to reduce winter flounder, scup and butterfish bycatch (SQUIDGRID).
7. Exploring bycatch reduction of summer, winter, yellowtail and windowpane flounders using 12” drop chain trawl net in SNE small mesh fishery.
8. Gear technology transfer: topless shrimp trawls for Gulf of Maine shrimp fishery.

FY10 Competition

1. Collaborative network approach to reduce bycatch in the Southern New England/Mid-Atlantic squid trawl fishery.
2. Experimental approach to butterfish bycatch reduction in the North Atlantic *Loligo* fishery-- habitat modeling.
3. Improving fishing efficiency through spatio-temporal tools to reduce bycatch
4. A spatial and temporal information management tool for bycatch avoidance in New England groundfish sectors.
5. A network approach to conservation engineering for the New England groundfish fishery: collaboration, outreach, and demonstration of alternative fishing gears.
6. CEMFIN: Conservation Engineering Marine Fisheries Initiative.
7. A network to redevelop a sustainable redfish (*Sebastes fasciatus*) trawl fishery in the Gulf of Maine (REDNET).
8. Cooperative industry/university/ government-based scup and sea bass survey utilizing fixed gear: catch rate analysis and survey peer review.

FY11 Funding

1. Cooperative industry/university/ government-based scup and sea bass survey utilizing fixed gear – Year 2 – Incorporating random sampling.
2. A spatial and temporal information management tool for bycatch avoidance in New England groundfish sectors - Year 2.
3. Study Fleet Vessels in the Groundfish and Loligo squid fisheries.

4. Development of a Wireless Temperature-Depth probe for use in real-time fisheries data collection.

NEFSC Trawl Survey Research – vessel survey contracts

1. Twin trawl - cookie - rock hopper sweep comparison in Southern New England.
2. Paired vessels – cookie – rock hopper sweep comparisons in GOM, GEB, SNE.

NEFSC Research – vessel contracts

1. Dogfish Tagging in Southern New England, the Gulf of Maine, and Georges Bank

Commercial Fisheries Research Foundation

2009 awards

1. Reduction of butterfish and scup bycatch in the inshore Loligo squid fishery.
2. Evaluation of new turtle excluder device (TED) design in the SNE and Mid-Atl summer flounder trawl fisheries.
3. Examining settlement dynamics of postlarval American Lobster in management area 2.
4. Discard mortality estimation of the SNE flatfish complex using RAMP methods.
5. Job satisfaction, well-being and change in SNE fishing communities.
6. Buzzards Bay lobster resource: are changes in reproduction having a negative impact on the fishery.
7. Temporal aspects of habitat utilization and interspecies competition: defining the ecological impacts of spiny dogfish in structuring ecosystem dynamics of SNE.
8. NOAA Award to CFRF – Groundline Exchange Program for Lobstermen in Management Areas 2 and 3

2010 awards

1. NEAMAP survey coverage RI sound. (2011, 2012)
2. Mapping of fish habitat in RI & Block Island Sound.
3. Temporal aspects of habitat utilization and interspecies competition: defining the ecological impacts of spiny dogfish in structuring ecosystem dynamics of SNE.
4. Innovative large mesh whiting trawl to reduce spiny dogfish bycatch.
5. Reduce winter flounder retention through avoidance gear in small mesh trawl fishery SNE and Mid-Atl. (large mesh panel in 1st belly). (full scale)
6. Is Cape Cod a natural delineation for migratory patterns in US and Canadian dogfish stocks?
7. Testing of a low profile excluder dredge for winter flounder bycatch reduction. (pilot and full scale)
8. A method to reduce winter flounder retention by minimizing variability in drop chain performance in the inshore Loligo small mesh trawl fishery off Long Island, NY within the Winter Flounder stock area. (pilot and full scale)
9. A large mesh groundfish trawl to reduce winter flounder bycatch (pilot).
10. Expansion of the Coastwide Ventless Lobster Trap Survey in Southern New England
11. NOAA Award to CFRF – RI Commercial Fishing Industry – Development of an Economic and Social Profile

2011 awards

1. An Industry based Yellowtail flounder survey in Southern New England.
2. An Industry based Winter Flounder survey in Southern New England.
3. An assessment of Quahog larval supply and distribution in upper Narragansett Bay.
4. An assessment of potential value of scallop viscera as aquaculture feed.

5. Determination of size and age at maturity and seasonal gonadal change in channeled whelk.
6. A Fisherman-Scientist collaboration to Re-assess lobster nurseries in Narragansett Bay.

Northeast Consortium

FY09 & 10 awards.

1. Herring sorting grid.
2. Defining Atlantic wolffish aggregations in Mass Bay.
3. Synoptic acoustic and trawl surveys to characterize biomass and distribution of the spring spawning aggregations of Atlantic cod in Ipswich Bay.
4. Environmental Management System training for fishermen.
5. Validation of New England's coastal circulation: Environmental monitors on lobster traps (eMOLT) VII.
6. Is the OLFISH electronic monitoring system a feasible tool for improving fishery-dependent data for the deep water red crab fishery?
7. Evaluating practicality and economic viability of a pilot redfish jig fishery.
8. Movement and migration patterns of winter flounder tagged along the Maine coast.
9. Application of broadband sonar technology for fisheries assessment and research.
10. Understanding the biological characteristics of the Acadian redfish in U.S. waters.
11. Reducing juvenile alewife, blueback, and American shad bycatch in the coastal poundnet and floating fish trap fisheries.
12. Estimating of discard mortality of yellowtail and winter flounder.
13. Studying the population of the channeled whelk (*Busycotypus canaliculatus*) fishery.
14. Modified shrimp trawl for deep water bycatch reduction and size sorting.
15. Direct assessments of juvenile Atlantic bluefin tuna using sonar and aerial technologies: Optimizing detection methods.
16. Video hook-and-line survey to further knowledge of cusk (*Brosme brosme*) distribution and habitat preferences.
17. The use of settlement collectors to investigate the early life history of Atlantic wolffish (*Anarhichas lupus*) and Cusk (*Brosme brosme*) in the Gulf of Maine.
18. Biological and oceanographic mechanisms influencing lobster larvae dispersal in NH coastal waters.

NCRP Research Set Aside Program Awards

Mid-Atlantic RSA Program 2008-2011

1. Data collection and analysis in support of single and multispecies stock assessments in the Mid-Atlantic: Northeast Area Monitoring and Assessment Program Near Shore Trawl Program (2008, 2009, 2010 & 2011).
2. Fishery Independent Scup Survey of Hard Bottom Areas in Southern New England Waters (2008, 2009, 2010, 2011).
3. Discard Mortality in the Summer Flounder Fishery: A New Approach to Evaluation (2008)
4. Evaluation of Summer Flounder Discard Mortality in the Bottom Trawl Fishery Part II: A Study of the Offshore Winter Fishery (2009)
5. A method to reduce butterfish retention in the offshore directed Loligo fishery through the use of a bycatch reduction device (BRD) adapted to pre-existing gear (composite square mesh escape panels & visual stimulation) (2010)
6. Understanding the Effects of Fishing on the Size, Age, and Sex Distribution of Black Sea Bass (*Centropristis striata*) During the Spawning Season (2011)

Monkfish RSA Programs 2008-2011

1. Evaluating the Discard of Monkfish Caught as Bycatch on Northeast Multispecies DAS and Directed Monkfish Trips: An Application of the Study Fleet Electronic Logbook Program (2008)
2. Movements, Growth, and Habitat Use of Monkfish Based on Archival Tagging and Otolith Elemental Analysis (2008, 2009, 2010, 2010)
3. Influence of Climate on the Distribution and Catch Rates of Monkfish, *Lophius americanus* (2008, 2009, 2011)
4. An Evaluation of the Effects of Gill Net Alterations on Selectivity and Relative Efficiency in the Monkfish Fishery (2008)
5. A Weight of Evidence Approach for Validating Age & Growth in US Monkfish (*Lophius americanus*) Stocks (2009)
6. An evaluation of tiedown length in monkfish gillnets on monkfish retention and the potential uses as a bycatch reduction measure. (2010)
7. Using Archival Tagging and Age Validation Efforts to Assess Monkfish Movement, Age Structure, and Growth (2011)

Scallop RSA Program 2008 - 2011

1. Sea Turtle- Scallop Fishery Interaction Study (2008 & 2009)
2. Developing Tools to Evaluate Spawning and Fertilization Dynamics (2008)
3. Characterization of Scallop Abundance and Benthic Habitat Using Optical and Acoustic Imaging Technology (2008 & 2009)
4. An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: Georges Bank Area II and the DelMarVA Closed Area (2008 & 2009)
5. Assessment of Sea Scallop Distribution and Abundance in Federal Waters of the Gulf of Maine (2008)
6. An Assessment of Hanging Ratio and Mesh Orientation of Twine Tops on Selectivity and Bycatch in the General Category Scallop Dredge Fishery in Scallop Limited Access Areas (2008)
7. High Resolution Video Survey of the Sea Scallop Resource, Recruitment Patterns and Habitat of the Elephant Trunk and Nantucket Lightship Closed Areas (2009)
8. Evaluation of Northwest Atlantic Ocean Continental Shelf Substrates (2009)
9. Testing of Sea Scallop Dredge Dual Mesh Size Twine Top for Bycatch Reduction (2009)
10. Continuing the Time Series: Calibrating the NMFS Sea Scallop Survey to the R/V Hugh R. Sharp (2009)
11. Scallop, Yellowtail Flounder, and Substrate Distribution in the Closed Area II Scallop Access Area and the Western Side of the Great South Channel (2010)
12. An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: Hudson Canyon Closed Area (2010)
13. Testing of Modifications to the Cfarm Turtle Excluder Dredge for Bycatch Reduction (2010)
14. High-Resolution Video Survey of the Sea Scallop Resource, Recruitment Patterns, and Habitat of the Hudson Canyon and Delmarva Closed Area (2010)
15. An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: Georges Bank Closed Area 1 (2010)
16. Real-Time Electronic Bycatch Reporting Pilot Project (2010)
17. An Assessment of Sea Scallop Abundance and Distribution in a Selected Closed Area: George's Bank Closed Area II (2011)
18. An Assessment of Sea Scallop Abundance and Distribution in a Selected Closed Area: Nantucket Lightship Closed Area (2011)
19. A Descriptive Sea Scallop Survey of the Federal Inshore Areas of the New York Bight Using a Camera Mounted Autonomous Underwater Vehicle (2011)
20. An Assessment of Sea Scallop Abundance and Distribution in a Selected Closed Area: New York Bight and Southern New England Area (2011)

21. Extension of the SMAST video survey in the Western portion of the Mid-Atlantic (2011)
22. Assessment of Sea Scallop Distribution and Abundance in Federal and Adjacent State Waters of the Gulf of Maine (2011)
23. Scallop biomass, bycatch and substrate distribution in the Hudson Canyon and Closed Area 1 scallop access areas (2011)
24. Testing of a Low Profile Scallop Dredge for Bycatch Reduction (2011)
25. Understanding the Impacts of the Sea Scallop Fishery on Loggerheads through Satellite Tagging (2011)
26. Effects of Mobile Fishing Gear on Geological and Biological Structure: A Georges Bank Closed Versus Open Area Comparison (2011)
27. Optimizing the Georges Bank Scallop Fishery by Maximizing Meat Yield and Minimizing Bycatch (2011)
28. High-Resolution Video Survey of the Sea Scallop Resource in the Hudson Canyon and Delmarva Closed Area (2011)
29. An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: DelMarVa Closed Area (2011)
30. Developing Tools to Evaluate Spawning & Fertilization Dynamics of the Giant Sea Scallop Phase II: Field Trials in Experimental Populations (2011)

Atlantic Herring RSA Program 2008 - 2010

1. Effects of Fishing on Herring Aggregations (2008)

Other National Marine Fisheries Service Research Award Programs

NEFSC Conservation engineering projects funded under National BREP and ACL funds.

1. Gear modification research to reduce the bycatch of butterfish in the offshore Loligo squid fishery (camera behavior studies and large mesh panel BRD in net extension).
2. Assessment of the Impacts of Gear Modifications in the Monkfish Fishery on Bycatch of Atlantic Sturgeon and Harbor Porpoise.

FY10 Saltonstall-Kennedy Grant Program – Northeast Awards.

1. Understanding opportunities and barriers to increase profitability for the Gulf of Maine lobster industry.
2. Test of floating trawl bridles to reduce finfish and bycatch in the Gulf of Maine pink shrimp fishery.
3. Conduct a collaborative research study on one of Maine's 'Species of Concern' in the near-shore Gulf of Maine, cusk (*Brosme brosme*).
4. Seasonal frequency and development of Hemic Neoplasia in the soft shell clam *Mya arenaria* along the east coast of the US.
5. Development of cod aquaculture for downeast fisherman.
6. A study of the social and economic capacity of eastern Maine fishing communities: how can small-scale fishing communities participate in catch share programs?
7. Submerged culture of steelhead trout for open ocean aquaculture in the northeastern US.
8. Dismissing Dogma II: the use of satellite tags to examine the behavior of spiny dogfish (*Squalus acanthias*) in relation to habitat use, depth preference and movement patterns in the western North Atlantic.
9. Restoring Long Island's winter flounder fishery: influence of natural and anthropogenic factors on health, fitness and recruitment success.
10. Developing markets for underutilized and undervalued seafood products in the Northeast: An industry collaboration led by GMRI.

11. Socioeconomic impacts of herring fisheries management in the Northeast: Looking back to move forward.
12. Development of an oral vaccine for nodavirus infection.
13. The economic impacts of “no-fishing” zones on Stellwagen bank National Marine Sanctuary: an analysis of the small-scale ground-fishing fleet and their local coastal communities.
14. Enhancing sea scallop stocks in eastern Maine through applied aquaculture research and technology transfer.

Appendix B: Cooperative Research Conservation Engineering BAA Projects (FY10)

April 2011

The Northeast Cooperative Research Program's (NCRP) Strategic Plan, developed in 2009 and approved by the Northeast Region Coordinating Council, calls for the development of a comprehensive conservation engineering program to achieve regional coordination and technology transfer to industry by establishing a network of fishermen, fishing gear manufacturers, gear engineers, marine scientists, marine fisheries economists, fishery managers and State/Federal agencies to conduct multidimensional research and technology transfer to commercial marine fisheries.

In order to develop this Conservation Engineering Network, the NCRP is supporting seven networked conservation engineering and bycatch reduction proposals funded at over \$3.0 million. Though each proposal will be adapted and modified over the life of the project according to the needs of the network, a brief description of each project and its initial role in the CE Network is given below.

Two proposals were funded which focus on bycatch reduction in small mesh fisheries targeting Loligo squid:

1. Collaborative Network Approach to Reduce Bycatch in the Southern New England/Mid-Atlantic Squid Trawl Fishery (Cornell Cooperative Extension, University of Massachusetts-Dartmouth School of Marine Science & Technology, University of Rhode Island)

This project has been funded to seek solutions to bycatch issues in the *Loligo* squid fishery by evaluating and optimizing several potential gear solutions. The project will also establish an outreach and extension program for successful gear selectivity in the SNE/MA small mesh fishery, and quantify the socio-economic benefits of improved selectivity and bycatch reduction based on project results.

Optional future phases of the project may be implemented to broaden the research focus to determine spatial and temporal distribution of target and bycatch species, and adopt real-time data collection protocols to collect and use data within the SNE/MA small mesh squid fishery. If successful, the project participants are prepared to employ the same network concept and strategies for other small mesh fisheries.

2. Experimental approach to butterfish bycatch reduction in the N. Atlantic Loligo fishery (Garden State Seafood Association, Cornell Cooperative Extension, Rutgers University, University of Delaware, University of New Hampshire)

This proposal has been funded to develop ecologically informed models for the specific purpose of reducing butterfish bycatch in the *Loligo* squid fishery in the Mid-Atlantic Bight using

Integrated Ocean Observing System (IOOS) habitat models developed with Fisheries and the Environment (FATE) project, and merged with behavioral models of squid fishermen.

Optional phases of this project may include an investigation into the *Diet and Fatty Acid Signature Analysis of Longfin Inshore Squid*. The goal of this project would be to better understand the role of longfin inshore squid as a predator in the Northeastern US continental shelf ecosystem. Results would be expected to improve ecosystem-based management of *Loligo* and their prey species by clarifying the role of *Loligo* as predators. An additional optional study includes *Modeling of bycatch reduction and Loligo predation effects on the population dynamics of butterfish*. The goal of this portion of the project would be to synthesize the results of the projects on habitat modeling and *Loligo* diet analysis, along with the gear modifications developed under Project 1 - *A Collaborative Network Approach to Reduce Bycatch in the Southern New England/Mid-Atlantic Squid Trawl Fishery* within the existing butterfish stock assessment model to examine the population level impacts of different bycatch reduction strategies.

One proposal was funded which focuses on the development of small mesh fishery solutions for a sustainable redfish fishery:

A Network to Redevelop a Sustainable Redfish (Sebastes fasciatus) Trawl Fishery in the Gulf of Maine (REDNET) (Massachusetts Division of Marine Fisheries, Maine Department of Natural Resources, Trawlworks, Superior Trawl, Reidar's Manufacturing Inc. Associated Fisheries of Maine, University of New Hampshire, several vessels)

The goal of this project is to devise strategies and test means to sustainably harvest the redfish resource in the Gulf of Maine through a network approach, including fishing enterprises, gear manufacturers, researchers, social and economic experts, and managers. The network group will define the research pathway for conceiving, developing and implementing research and outreach strategies to sustainably access the redfish resource under the current sector and ACL management regime.

Potential out-phases of this project could include the development of a real-time, temporal-spatial management tool, or expansion of results into other small mesh fisheries, such as whiting.

Two proposals were funded to investigate and develop gear-based solutions to large mesh groundfish fishery bycatch issues:

1. *A Network approach to conservation engineering for the New England groundfish fishery: collaboration, outreach and demonstration of alternative fishing gears (Gulf of Maine Research Institute, University of Massachusetts-Dartmouth School of Marine Science & Technology, Superior Trawl RI, Massachusetts Division of Marine Fisheries, four vessels)*

This proposal has been funded to research and demonstrate alternative trawl or other gears which have the potential for reduced bycatch and discards in the groundfish fishery, the use of catch sensors for greater catch control, and other emerging sector needs on a sector-by-sector basis.

This project plans to investigate and test specific sector's needs and ideas, and facilitate industry's adoption of alternative gears into commercial practice.

2. CEMFIN: Conservation Engineering Marine Fisheries Initiative (*Massachusetts Division of Marine Fisheries, University of Massachusetts-Dartmouth School of Marine Science & Technology*)

This proposal has been funded to investigate a novel gear approach to bycatch control by attempting to develop a system that closes off the codend on demand, prevents additional catch, and allows fish in other parts of the trawl to escape. In addition, this proposal contains the means to support other gear-related projects within the network by providing funds for vessel-time and sea-going staff at much lower overhead rates than available through other entities. In addition, a portion of the funding has been designated for network equipment purchases or replacements, should the need arise. The CEMFIN proposal provides a great deal of flexibility for overall network field operations and support, as well as developing research needs as determined by network participants.

Two proposals were funded to investigate and develop temporal-spatial solutions to large mesh groundfish fishery bycatch issues:

1. Improving fishing efficiency through spatio-temporal tools to reduce bycatch (*Cape Cod Commercial Hook Fishermen's Association, Duke University, Island Institute, Groundfish Port Clyde Sector, Groundfish Fixed-Gear Sector*)

This project is funded to develop a temporal-spatial tool associated with the existing Sector Manager Tool currently in use in some sectors to assist fishermen throughout the region in avoiding non-target species that have the potential to shut down groundfish fisheries. The project will utilize retroactive data via logbooks, EVTR, landings, oceanographic data, etc., and real-time data from selected sector reporting data streams in the analyses to provide near real-time management and decision options. The project team will synthesize available information for fisheries managers through an analytical framework for the spatio-temporal management of fisheries to reduce non-target species interactions and increase fishing efficiency, and develop a concrete, user friendly tool that is an extension of the existing Sector Manager Tool. This tool should increase economic efficiency within sectors through targeted harvesting that capitalizes on healthy stocks while avoiding weak stocks.

2. Spatial and temporal information management for bycatch avoidance in New England Groundfish Sectors (*Gulf of Maine Research Institute, University of Massachusetts-Dartmouth School of Marine Science & Technology, Ocean Data Products, Groundfish Sector 5, Groundfish Sector 6, Groundfish Sector 10, University of Maine*)

This project is funded to take a broader view of the utility and potential for temporal-spatial information tools and work closely with the fishing industry to design a decision support system that will effectively deliver information to them to help minimize bycatch.

While the previous project, *Improving fishing efficiency through spatio-temporal tools to reduce bycatch*, focuses on developing a temporal-spatial tool for use with a particular software system, the partners on this project will take a broader perspective of the possible mechanisms for a temporal-spatial bycatch avoidance tool, and develop a detailed set of product functional requirements that will describe what information fishermen need, how they need to interact with it, and how it can be effectively delivered to them (e.g., website, email, text message, etc.). The information management team will develop a set of technical product requirements that describe the information architecture (hardware and software) required to implement the functional requirements. The project proposes to develop a spatially-enabled relational database management system that will support the delivery of data to near real-time information products (e.g., web based maps). This component will need to be housed within the Science Center to maximize the use of the data stored there and unavailable for distribution because of confidential considerations.

While this project will record the requirements for the Sector Manager Tool project described above, the addition of the real time information from EVTR systems may need to be developed as a distinct component that can function with the differing systems being developed (such as Olfish, SIMMS, FLDRS and Fishtrax). Thus, while the above project will complete work to provide this component to a particular tool, the GMRI team will develop a set of requirements that would enable a component to be developed for any of the electronic reporting tools. This will facilitate the possible development of temporal-spatial management tools for any of the network projects described here.

One proposal was funded to address data analysis and methodology review of fixed gear surveys:

Cooperative industry/university/ government-based scup and sea bass survey utilizing fixed gear: catch rate analysis and survey peer review (University of Rhode Island, Rhode Island Department of Environmental Management, Massachusetts Division of Marine Fisheries, Three vessels)

This project performed a thorough analysis on all the Research Set-Aside scup pot survey data collected to date, and convened a peer review workshop where analysis of its use in stock assessments was determined. The workshop involved scientists from NOAA Fisheries and outside experts. Additionally, the panel reviewed the current state of knowledge involving fixed gear studies, with a particular focus on scup and black sea bass. Recommendations for the sampling design of expanded fixed gear surveys also were made.